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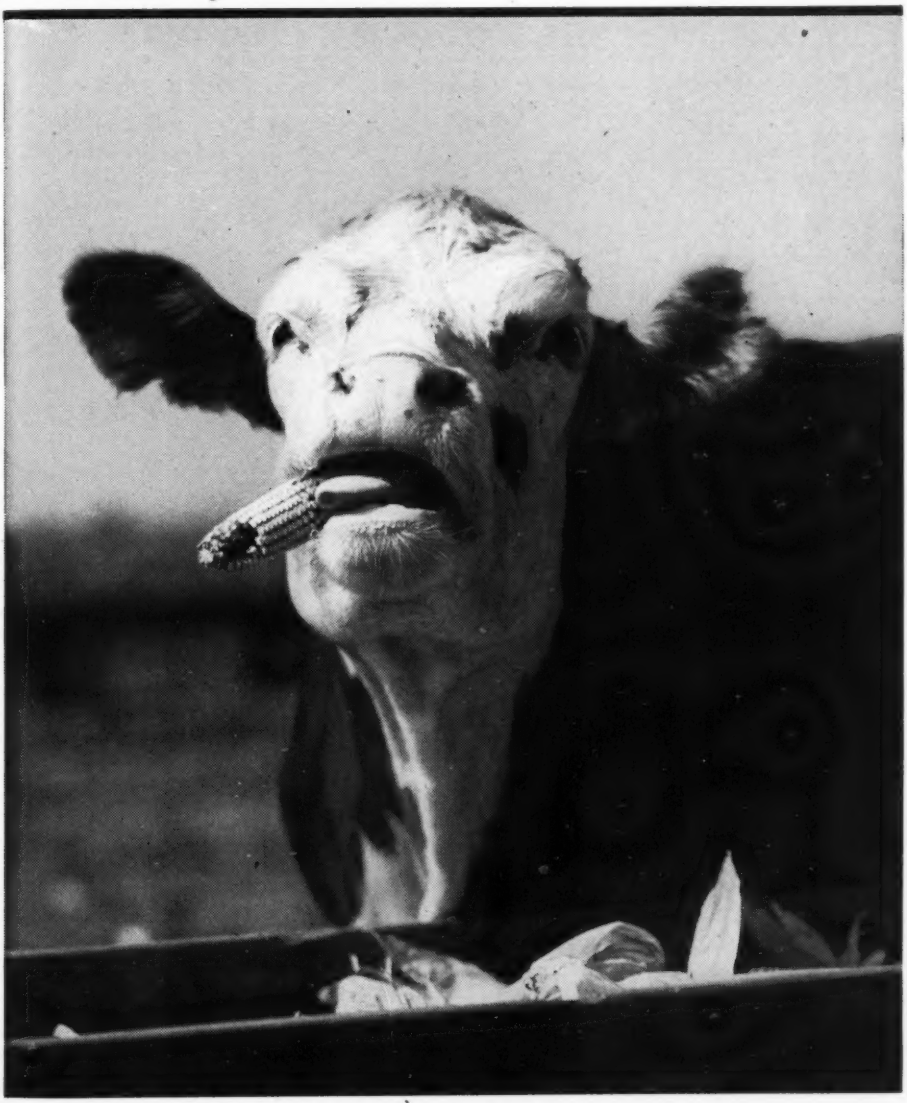

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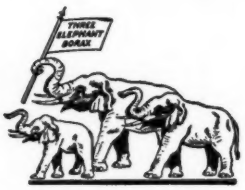

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Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Editor*

Editorial Office: 1155 16th Street, N. W., Washington 6, D. C.

VOLUME XXX NO. 2

TABLE OF CONTENTS, FEBRUARY 1946

Tenderfoot Tale 3
Is Recalled by Jeff

Profit on Mississippi Soils From One Ton of Potash Under Cotton 6
Reported by C. Dale Hoover

Plow-Sole Placed Plant Food for Better Crop Production 10
Described by C. J. Chapman

Boron Deficiency of Lettuce 17
Discussed by A. R. Midgley and D. E. Dunklee

Correcting Potash Deficiency in Growing Corn 21
Is Advocated by John B. Washko

"Thank You Farm" 24
T. S. Buie Tells a Story of Courage & Gratitude

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WINTER SOLITUDE

Better Crops with PLANT FOOD

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VOL. XXX WASHINGTON, D. C., FEBRUARY, 1946 No. 2

Reliving a . . . . . .

TENDERFOOT TALE

Jeff McDermid

THE showing of a current roistering western film called "Dakota," prompts this unreeling of a "post-view" glimpse of a raw and shrinking tenderfoot who helped "settle" the Trans-Missouri buffalo grass empire, but who returned to the Lake States without riding a cow pony or heating a branding iron.

This exclusive historical tidbit deserves no place in the archives of the border country but it remains a vivid memory to an erstwhile youth who dared to cross the range country wearing a blue serge suit, patent leather shoes, and an iron-crowned derby, the uniform of his high-school graduating class of 1907.

This questionable raiment for a pioneer was, however, somewhat counterbalanced by the stewardship of two large pine boxes, a fair-sized trunk, a yellow mongrel dog, and a bewildered and agitated mother. When the anxiety complex of the mother and the inexperience of the youth are added to the captious and erratic behavior of the dog, abroad in a far country, as well as the constant alarming signs of structural weakness and leakage in the baggage boxes, the net result spells suspense and adventure.

It is well to warn readers that there is nothing in this hegira or the establishment of forgotten facts which claims any competition with Dan Casement or other votaries of rangeland progress. I am reviving this romantic interlude for no other than pastime purposes, and the only distinctive thing about it is that one so green and callow should have survived the wrath of the wran-

glers or the lariats of the ranch hands whose short pastures were threatened by an unwelcome army of Midwest settlers—making the last great migration into the last remaining unplowed zone of the Great Plains.

IT all began in the summer of 1906, when the itch to assert his special privilege under the Homestead Act came to a retired Midwest farmer who had worn a blue uniform in the unpleasant debate of 1861-65. You may recall that old soldiers of the north had certain rights of eminent domain accorded them so that they might shorten their length of residence on newly opened lands upon "proving up" and payment of a nominal acreage fee.

The burden of some three score and six years did not deter this venturesome sand-land resident in his resolve to get title to a quarter-section of deep, rich, upland prairie, the kind of land his own father had passed up in 1845 while searching primarily for timber and water to make his homesite. This and the natural resistance of an active man against the rust of retirement combined to send him forth alone to file on his claim in Pennington County, South Dakota.

(Meanwhile I see by the papers that sundry U. S. Senators upon attainment of undisputed seniority at ages seventy to eighty are quarreling somewhat over the advisability of resigning. It's too bad that some of them cannot find some new and unlikely goal for their vestiges of vigor just as this Old Soldier of mine braved bachelor fare and drafty shacks to prove his faith in himself and America.)

Be that as it may, the good old G. I. of the Victorian era set forth without consulting his Grand Army post or without looking for cheap Government loans, and minus the advice of the Department of Agriculture, the Farm Security offices, or any resident county agents or local first-aid committees.

Of his exploits and privations in the west we heard but little as he was a slow hand with the pen, but with the coming of graduation week in a sticky humid June time, word reached us to rent the Midwest place and "fall in" for the westward ho in a hurry. This brings me back to the starting point, except to explain why the dog went too.

IT was intended to "farm out" the canine for a couple of years—a regretful decision to make after divers vacation days of comradeship and loyalty had practically given Major full rank in our humble outfit. He was a complex crossbreed, resembling a pug dog in front, a terrier in the middle, and a beagle behind. But on the night we boarded the Pioneer Limited Express for St. Paul and beyond, the dog escaped and arrived on the baggage platform in time to be checked with our emigrant luggage and placed in the car with the boxes.

For once the judgment of a lowly cur excelled that of the genus homo. If there ever was a time when the enthusiasm and inquisitive ardor of a worryless animal came in good stead against homesick boredom and anxiety, this was such an occasion. A kid on a claim in a virgin vastness, tumble weeds, and blowing prairie grass brushing the low clouds bending down to those high plateaus; no old chums to rally with, and some sickness in the shack—then indeed a dog's tagalong tendency made each long walk a happy one.

That he remained on the job until the end and then returned to his old posts and perquisites in the Midlands after all the papers were certified and the land was sold is a testimonial to his rugged nondescript constitution and his native loyalty. That he sleeps on his native heath with no fitting marker is evidence of man's forgetfulness.

All one can do to atone for such neglect of a friend is to remark with candor that some accepted friends since acquired over a span of seasons have fallen short of the unselfishness and honesty of this mongrel, whose bones have long since yielded lime and phosphate for the soil in which he dug so

many gophers. Animals, they say, have no souls, but there is something left in the wake of good ones that "marches on" to beat Old John Brown at his darndest.

Well, taking dog and Ma and the household treasure out across the plains of Minnesota and eastern Dakota to Pierre in the gumbo valley was no great test or trial. The ruckus began at the muddy Missouri where a ferry was used to land our cargo on the west bank ready to take the new line of steel and slow motion halfway to the promised land. At Cottonwood there was a

break of over fifty miles of unfinished railroad. We slept for a night of expectancy in a rude frontier construction gang settlement and got our breakfast menu of sour-dough biscuits and bacon served at a sage-brush chow house. The dog and I relished this fare better than our frail mistress, whose courage was kept firm by the seeing and believing of things but scantily learned from Bret Harte's books or grade school geographies.

From here on I lose the trail of accurate remembrance of people's names encountered on this eventful journey west. Had I then possessed the talent for noting names, initials, and titles since acquired in news writing, the characters of those fresh acquaintances would be properly tagged to give them actual locale and proper credit. Maybe I really met some friend of Buffalo Bill or Constable Hickox, or some founder of Dakota destiny en route—but this fault is too late to rectify.

AT any rate, picture for yourself a gawky high school product arrayed in aforesaid unsuitable style, clutching a stiff derby in the wanton wind, traveling on the driver's seat of a regular old wild west stage-coach drawn by six horses. (I had seen one just once before that, during the thrills of a Cody cowboy and Indian classic on the county fairgrounds at home.)

The laconic and stoical rein-boss beside me was a veteran stage-coach Jehu. He had all the flair and feeling in his clothes and manner that I lacked. I was too dazed and excited to inquire his name. His chief and sole delight was to chew tobacco appetizingly and to warn me of possible trouble for passengers and plunder when we made sundry fords of the Teton or Bad river. It was a quicksand region, he advised, very treacherous and ticklish for old-timers and tenderfeet alike; and coaches burdened with baggage had been known to flounder to the bottom, with miraculous rescues common and frequent.

His unerring whip-lash leaped out in emphasis to flick a horn fly off the lead nigh horse's ear, and he answered my Indian warpath query by a sullen and guarded hint that there were six-shooters in the equipment but no special guard with Sharp's rifles to scan the horizon for feathered fiends.

I hasten to assure you that we made the fords safely—albeit a bit shaken and bounced about going down and coming up those steep banks of the Bad, on its meandering course through the dog-towns and draws. I counted four spoons and two salt-shakers missing from our battered boxes when we reached the junction point at evening; but Ma and the dog were right side up. They had shared the inside seats with a school ma'am and a feed salesman whose interest in each other kept the journey lively and romantic.

(*Turn to page* 50)

Profit on Mississippi Soils From One Ton of Potash Under Cotton

By C. Dale Hoover

Department of Agronomy, Mississippi State College, State College, Miss.

POTASH must be applied along with nitrogen and phosphate to most of the soils of the hill section of Mississippi and to soils in or near the foothills of the Yazoo-Mississippi Delta in order to obtain the most profitable yields of cotton, according to a summary of all cotton fertilizer analysis tests which have been conducted by the Mississippi Agricultural Experiment Station during the period 1925 to 1942.

Mississippi used an average of 10,087 tons of potash (K_2O) annually for the 6 years (July 1, 1937 to July 1, 1943), according to the records of the State Department of Agriculture. This tonnage is equivalent to 16,960 tons of 60 per cent muriate of potash, and represents an annual expenditure of $848,000 for potash in Mississippi, if 60 per cent muriate of potash is valued at $50 per ton.

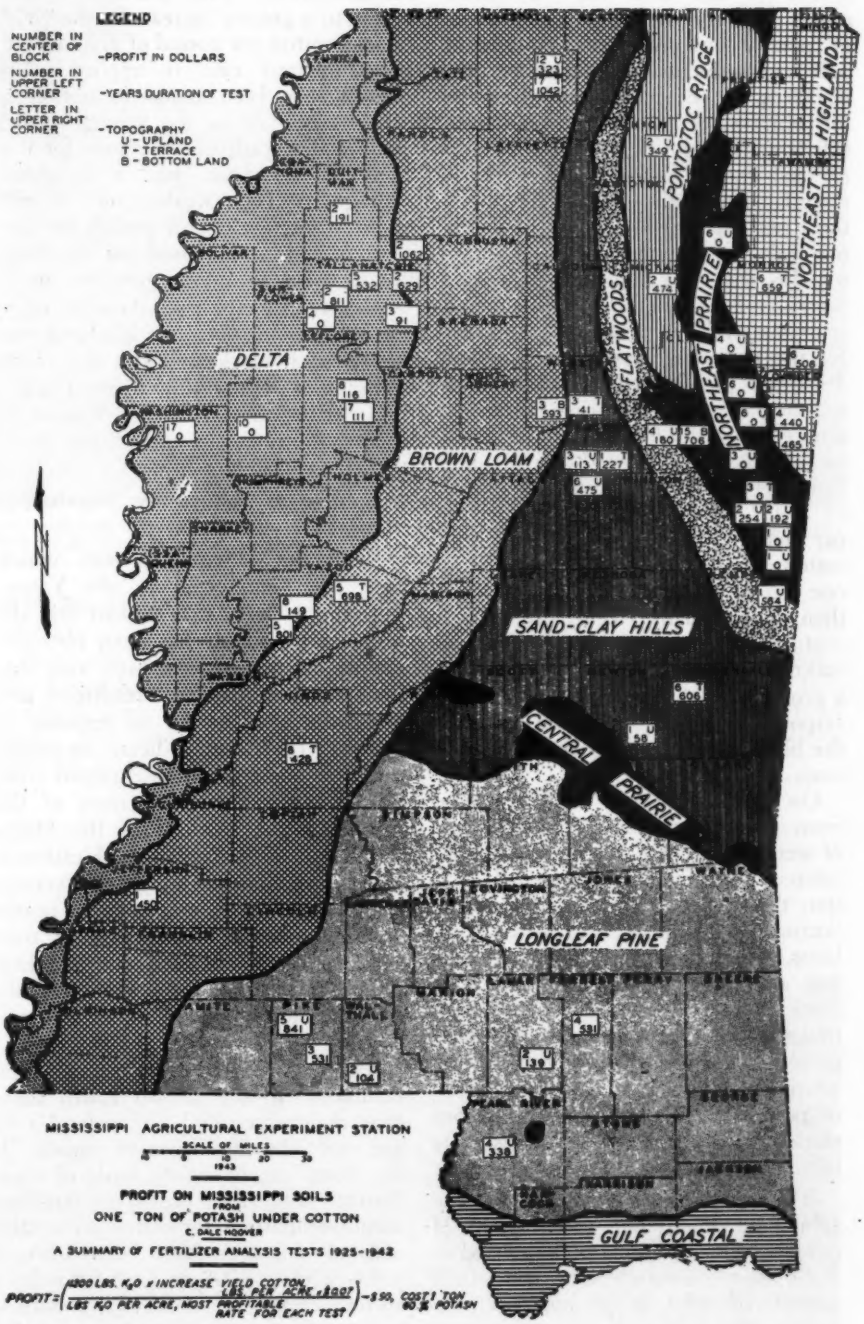
It is estimated that over 75 per cent of the potash purchased in Mississippi for the 6 years was used in the fertilization of cotton. Since such a large percentage of the total potash sold in the State is used under cotton, and since cotton is the major crop in this State, results of all fertilizer analysis tests with cotton have been summarized and profit from increased yields due to potash have been calculated for all of the tests. In all tests the response to potash has been obtained in conjunction with some standard rate of nitrogen and phosphate application.

Results of the various tests have been placed on a soils map of the State in order to obtain a better picture of the relative profit from the use of one ton of potash under cotton within and between the various soil areas. All of the data presented have been published in various bulletins and information sheets, but no summarization of them has ever been made. The map, therefore, shows not only the response of some of the soils of Mississippi, to potash, but presents a picture of the approximate location of every fertilizer analysis test conducted in Mississippi during the period 1925 to 1942. It also shows the length of time each test was carried out, and for the hill section it includes, where possible, the topography of the areas upon which the tests were conducted.

The large figures in the center of each block on the map give the profit in dollars from the use of one ton of 60 per cent muriate of potash when used at the rate found to be most economical for the test in question. According to the formula used to calculate profit, the increased yield of cotton due to the use of one ton of potash is valued at 7 cents per pound minus $50 (the cost of one ton of potash).

Method of Calculating Profit

As an example of how the profit was calculated, on the Central Station Farm at State College, the average increase for a 15-year period (1925-1939) from 600 pounds of 4-8-8 (8 units of potash) over 600 pounds of 4-8-0 (no potash) has been 432 pounds of seed cotton per acre. The average yields for the above treatments were 794 pounds from the 4-8-0 treatment and 1,226 pounds seed


LEGEND
NUMBER IN CENTER OF BLOCK -PROFIT IN DOLLARS
NUMBER IN UPPER LEFT CORNER -YEARS DURATION OF TEST
LETTER IN UPPER RIGHT CORNER -TOPOGRAPHY U - UPLAND T - TERRACE B - BOTTOM LAND
DELTA
BROWN LOAM
SAND-CLAY HILLS
CENTRAL PRAIRIE
LONGLEAF PINE
GULF COASTAL
FLATWOODS
PRAIRIE
PONTOTOC RIDGE
NORTHEAST HIGHLAND
MISSISSIPPI AGRICULTURAL EXPERIMENT STATION
SCALE OF MILES
1943
PROFIT ON MISSISSIPPI SOILS FROM ONE TON OF POTASH UNDER COTTON
C. DALE HOOVER
A SUMMARY OF FERTILIZER ANALYSIS TESTS 1925-1942
PROFIT = (1000 LBS. K2O x INCREASE YIELD COTTON, LBS. PER ACRE x $.007 / LBS. K2O PER ACRE, MOST PROFITABLE RATE FOR EACH TEST) - $.90, COST TON 90 % POTASH

cotton per acre from the 4-8-8 treatment. One ton of 60 per cent muriate of potash contains 1,200 pounds of potash expressed as K_2O; therefore 1,200 (2,000 x 60 per cent) is used in the formula. Since the average yield from 600 pounds of 4-8-12 was 1,248 pounds of seed cotton as compared to 1,226 pounds from the 4-8-8 treatment, the latter was considered the most economical rate of application of potash for this test. Six hundred pounds of 4-8-8 fertilizer contains 600 x 8 per cent (last figure in 4-8-8 fertilizer stands for the percentage potash as K_2O) or 48 pounds potash (K_2O) per acre. The number of acres one ton of 60 per cent potash will fertilize at the above rate is then determined by dividing 1,200 by 48, which gives 25. Then, 25 x 432 pounds seed cotton increase per acre equals 10,800 pounds seed cotton increase from 25 acres due to one ton of potash. If this increase is then multiplied by 7 cents (10,800 x 7 cents) and the cost of one ton of potash subtracted from the result ($756—$50), a profit of $706 is obtained, which corresponds to the figure in the center of the block for this test as shown on the map.

On those locations where increase from potash was less than 25 pounds of seed cotton per acre, potash was considered unprofitable, and for all such tests the profits is shown as 0. While fluctuations in the price of seed cotton, labor, ginning, and potash materials will affect the actual profit in dollars from the use of one ton of potash under cotton, the figures as presented give a rather accurate picture of the relative profit from the use of one ton of potash under cotton in the various sections of the State where tests have been conducted.

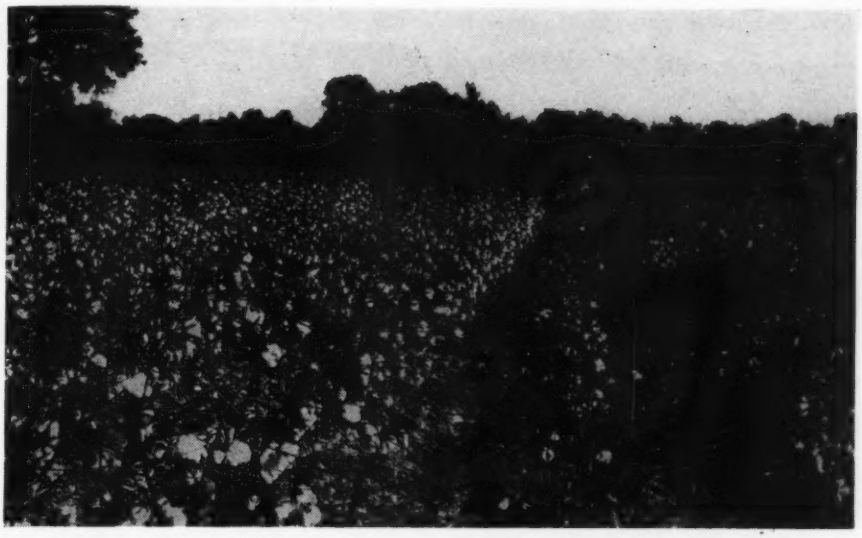
It should be pointed out that in some areas in which not more than 24 pounds of potash per acre, expressed as K_2O, are recommended for cotton (600 pounds of 4-8-4 or its potash equivalent), the profit from one ton of potash may be more than for other areas where higher rates of potash are recommended. This increased profit is due to a greater increase in the yield of seed cotton per pound of K_2O where the 24-pound rate is applied. No attempt has been made to obtain a reliable estimate of the average profit per ton of potash under cotton for the State as a whole, but a weighted average has been worked out for the profit from one ton of potash for the various soil areas based on the tests conducted within the respective areas.

As shown in the legend on the map, the number in the upper left-hand corner of each block indicates the years, duration of the test and the letter in the upper right-hand corner, wherever it occurs, indicates the topography upon which the test was located.

Response to Potash by Mississippi Soils

From the 11 analysis tests which have been conducted in the Yazoo-Mississippi Delta, it is evident that the response to potash has been obtained mainly in the eastern part, and that the long-time tests at Heathman and Stoneville have shown no response to potash. These data indicate, no doubt, that a response could be expected from potash under cotton on most of the soils near the foothills of the Delta. If the tests at Stoneville and Heathman are omitted and a weighted average, which gives more emphasis to results obtained over a long period of time than to those obtained over a short period, is calculated, the average profit from one ton of potash under cotton is $269.

The eight tests which have been conducted in the Brown Loam show that the terrace and bottomland soils are especially responsive to potash. It has been largely on the basis of these results that the ordinary fertilizer recommendations for cotton on upland soils of this area have been 4-8-4 or 6-8-4, while a 4-8-8 or a 6-8-8 has been recommended for terrace and bottom soils. A weighted average for the response to potash in this area shows a profit of $682 for the use of one ton

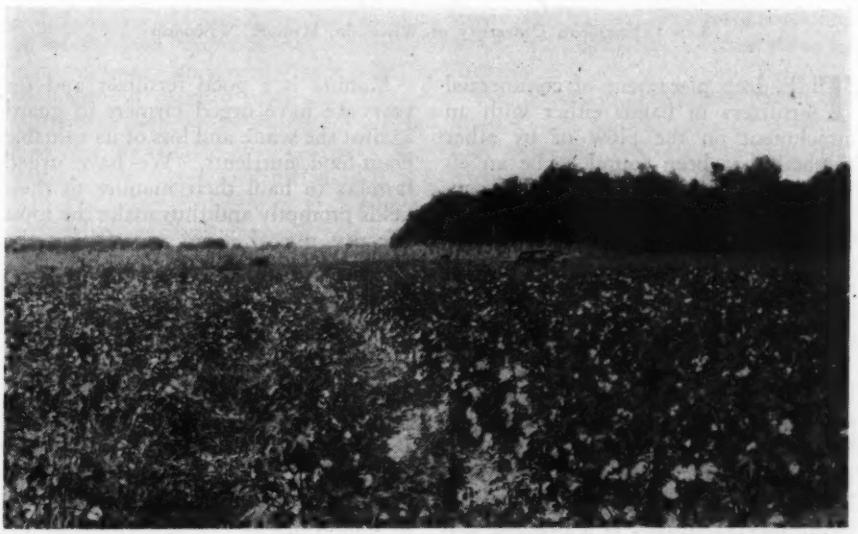


The cotton on the left was fertilized with nitrogen and potash; that on the right with nitrogen only. This is an example of a deficiency of potash with cotton on a soil in the foothills of the Yazoo-Mississippi Delta.

of 60 per cent muriate of potash under cotton.

From the six different locations at which tests have been conducted in the Longleaf Pine area, the response to potash has been considerably lower than the average figure for the Brown Loam. Considering the size of this area, there have been fewer tests conducted than for some of the other areas. The best estimate, however, which can be obtained from the tests which have been carried out shows the profit from one ton of potash under cotton to be $488.

(*Turn to page* 49)



The cotton on the left was fertilized with 600 pounds of 6-8-0 per acre; that on the right with 600 pounds of 6-8-8 per acre. Potash increased the yield of seed cotton 356 pounds per acre as an average for a period of five years.

Attachments for the placement of fertilizer on the furrow bottom can be mounted on most any make of plow. Here the equipment is mounted on a Ford Ferguson set of plows.

Plow-Sole Placed Plant Food For Better Crop Production

By C. J. Chapman

Soils Department, University of Wisconsin, Madison, Wisconsin

THE deep placement of commercial fertilizers in bands either with an attachment on the plow or by other methods has been found to be an effective, efficient, and safe way of supplying large amounts of plant-food nutrients for corn and certain other crops.

An application of from 700 to 800 pounds of 8-8-8 per acre supplies approximately the same amount of plant food as is contained in six to seven loads of reinforced barnyard manure. (By reinforced, we mean manure to which from 20 to 30 pounds of 20% superphosphate have been added to each ton.) The reinforcing of manure with superphosphate is a practice that has been recommended by experiment station authorities for many years.

Manure is a good fertilizer and for years we have urged farmers to guard against the waste and loss of its valuable plant-food nutrients. We have urged farmers to haul their manure to their fields promptly and thus make the most effective use of it in replenishing the productiveness of their cropland. The fertilizer value of all manures produced annually by Wisconsin livestock is said to amount to $100,000,000. However, losses of nutrients, due to careless and wasteful methods of handling, amount to some 35 to 40 million dollars each year. As an offset to the annual losses incurred in the feeding transaction plus those losses sustained in the handling of manures, our Wisconsin farmers are now buying and applying some 250,000 tons of commercial fertilizers. (Losses

of nitrogen in manure are partly offset by gains from the growing of legumes.) But even 250,000 tons of commercial plant food, presently used by Wisconsin farmers and costing some eight million dollars, fall far short of balancing our soil fertility budget. And so it does appear that the feeding of crops to livestock and the return of the manure produced to our soils have not maintained the productiveness of Wisconsin farm land. The very fact that losses of plant food in a livestock system of farming are high and that these losses have been going on for many years is the reason why our soils are running so low in their reserves of available phosphorus and potash and why our crops are responding so generously to fertilizer treatment.

A Fertility Program

For many years we have been recommending a fertility program about as follows: The liming of every acre of acid soil on the farm and the application of from 200 to 300 pounds per acre of a phosphate or phosphate-potash fertilizer such as 0-20-0, 0-20-10, or 0-20-20 at the time of seeding down. For corn in the rotation, we have advised the application of 100 to 150 pounds per acre of 3-18-9 or 3-12-12 fertilizer in the hill or row as a supplement to stable manure. In my judgment, this is a well-rounded soil fertility program.

But this program in Wisconsin is just now getting under way. There are thousands of acres of land planted to corn and other crops every year where manure is not available and where no commercial fertilizer has ever been used in the grain-hay-corn rotation. And so I ask the question, "Why not give our farmers a commercial substitute for manure?" The fertilizer grade, 8-8-8, is the chemist's answer to the farmers' demand for a well-balanced plant food and, where plowed under with crop residues or green manure and placed in bands at a depth of from six to eight inches by any means which the agricultural engineer has yet devised or may be able to design, comes about as close to the plowing under of manure as anything we have yet conceived.

Most of us agree that manure reinforced with phosphate is an ideal fertilizer for corn and for many other non-leguminous crops where grown on average upland mineral soils. Most farmers plow their manure under for corn. What is wrong with plowing under 8-8-8 as a substitute for stable manure? Certainly we wouldn't suggest removing part of the nitrogen or potash from manure in order to make it a 1-2-1 ratio. Therefore, why isn't the 8-8-8 or similar 1-1-1 ratios a legitimate fertilizer to use for corn on highland mineral soils where manure is not available.

It is true the 8-8-8 grade does not meet the requirements of all crops on all types of soils. The N-P-K ratio must be adjusted to meet varying situations. On the dark-colored organic soils we should use relatively more potash and less nitrogen. For such special crops as sugar beets, potatoes, cabbage, carrots, and tobacco which have high potash requirements, we suggest mixtures with relatively more K_2O. In Wisconsin, we have included a 6-6-18 grade on our recommended list to meet the requirements of these special crops where heavy applications of commercial fertilizers are used as a substitute for manure.

We, of course, recognize the fact that manure is a source not only of plant-food nutrients, but of organic material. It takes a ton of reinforced (phosphated) manure to supply the equivalent amount of plant food contained in 100 pounds of a 10-10-10 fertilizer. It is true the organic matter supplied in a ton of manure does add to its value and gives manure an advantage over commercial plant foods.

Where these heavy applications of commercial fertilizers are plowed under or applied on the plow-sole or placed at depths of from six to eight inches by other devices, best results are usually secured where the soil is supplied with plenty of organic matter and is in a good state of tilth. The plowing under

of crop residues or second crop clover and the building up of the humus and organic-matter content of the soil permit such soils to "breathe." Thus organic matter in the form of crop residues and green manures incorporated with our soils does to some extent compensate for the organic matter factor and the superior results attributed to manure.

This matter of soil ventilation and aeration is important. Dr. G. N. Hoffer in articles which appeared last year in Better Crops with Plant Food under the titles, "Fertilized Corn Plants Require Well-Ventilated Soils," and "Some Whys and Wherefores For Air-Conditioning Soils" (now available through the American Potash Institute as reprints A-1-45 and G-2-45) explains in clear and understandable language the reasons why some farmers have failed to see response from the application of large amounts of high-nitrogen fertilizers on wet or poorly aerated soils.

"Negative response or poor results," says Dr. Hoffer, "occur mostly in heavy-textured soil either because of poor drainage facilities or because the tilth or porosity of the soil has deteriorated due to a depletion of the organic matter. The growing roots of corn, need free oxygen." We, therefore, caution against the plowing under of high-nitrogen fertilizers on those heavy-textured soils where organic matter has been depleted and where compaction has resulted from plowing a heavy soil when too wet. We know, however, that crop rotation and the plowing under of organic residues will keep our soils open and well aerated. The application of stable manure helps to accomplish this.

Certainly in any good system of soil and crop management, farmers should rotate their crops. And again I say that the regular and systematic use of phosphate-potash fertilizers should be a part of every Wisconsin farmer's program of soil-building. We urge the application of from 200 to 500 pounds of 0-20-10 or 0-20-20 per acre at the time of seeding down. Where such practices are followed and legumes are grown and fed on the farm and where all the manure produced is carefully preserved and returned to the cultivated fields, there isn't much place on such farms for plow-sole fertilizing. An application of from 100 to 200 pounds of starter fertilizer per acre applied with an attachment on the corn planter is about as far as I would go in my recom-

An 8-8 8 fertilizer applied at 800 pounds per acre on the plow-sole increased the yield of silage corn by eight tons per acre on the farm of Alwin Williams, Marshfield, Wisconsin. (Spencer silt loam).

mendations on such farms. In other words, if we have built up the level of fertility on our farms to a point where we can normally expect 60 to 70 bushels of corn per acre, there is less need for plow-sole fertilizing, at least for the corn crop.

But we know that this high state of fertility does not exist on very many fields of the average Wisconsin farm. There are hundreds of thousands of acres of corn every year that are making less than 40 bushels per acre. The average yield of corn in Wisconsin for 1945 was 40 bushels, and while on the one hand there were many thousands of acres that made yields of 70, 80, and 90 bushels per acre, those high yields are brought down to the 40-bushel level when averaged in with the thousands of acres of corn that made from 20 to 40 bushels per acre.

What should we as agronomists tell those farmers who are growing corn on fields that make less than 40 bushels per acre? Should we tell them to wait until they have limed and fertilized every acre of their cultivated cropland and have gone through two or three crop rotations in a long-time, soil-building program? Or, should we tell them about a short cut to high yields through the liberal use of commercial plant foods? The smart farmer isn't going to wait for 10 years to arrive at this 65-bushel-per-acre level of fertility. He is going to take the short cut and get his fields into high production now. We know, too, that the residual effect of fertilizers applied at rates of 700 to 800 pounds per acre will more quickly enable the farmer to achieve better crops of grain and legumes in the rotation.

Residual Effects

Right here is a good place to discuss this matter of residual effect of plow-sole fertilizer. Just how much residual carry-over can be expected from, let's say, an application of 800 pounds of 8-8-8 to the corn crop. In 800 pounds of 8-8-8 we are supplying 64 pounds each of nitrogen, phosphoric acid (P_2O_5), and potash (K_2O). The chemist tells us that a 75-bushel crop of corn (grain, fodder, and cobs) requires approximately 120 pounds of nitrogen, 42 pounds of phosphoric acid (P_2O_5), and 80 pounds of potash (K_2O). Where the corn crop is grown on rather low fertility soil (a field that in southern Wisconsin would only make 30 or 40 bushels per acre) we can assume that most of the nitrogen applied in this 800 pounds of 8-8-8 will have been used up the first year. But, I think it is safe to say that one-half of the 64 pounds of phosphate and potash is left as an unused residue, and therefore becomes a residual to succeeding crops. If this is true, then there is actually a carry-over of 32 pounds each of P_2O_5 and K_2O which is equivalent to 150 pounds of 0-20-20. This isn't a large carry-over but it is at least comparable to the residual carry-over from a 300-pound application of 0-20-20 applied to grain and legume seedings. And we have talked for years about the residual benefits to clover and alfalfa from applications of 300 pounds of fertilizer used at the time of seeding down. We show in our experimental records increases of a ton or more clover or alfalfa due to this residual effect.

You will immediately ask, "Why use this excess of phosphate and potash on corn?" My answer is: "Let's play safe and be sure that we are supplying adequate amounts of all plant-food nutrients." The maturity factor of corn must be reckoned with, too. We know that phosphorus backed up with adequate supplies of potash does push maturity. Furthermore, I do not think we should quibble about a little excess of phosphate or potash that we leave in our soil when for 30 years we have all been preaching the doctrine of building up the reserves of these mineral elements in our soils.

I would advise a farmer to apply from 150 to 200 pounds of a 0-20-10, 0-20-20, 3-12-12, or 4-12-8 per acre on small grain and legume seedings the year following corn even where he plow-soled from 800 to 1,000 pounds of 8-8-8 the previous year. This fertilizer for

grain, where drilled with the seed, is just as much needed as the starter fertilizer we have advised for corn as a supplement to manure or plow-sole treatment. I am suggesting to farmers that they plow somewhat shallower for grain following plow-sole or plow-under fertilizer on corn. We thus leave the residual banded fertilizer on the furrow bottom where again it is in a most advantageous relationship to moisture supplies and the feeding roots of both grain and legumes.

In connection with the residual effect of fertilizer applied on the plow-sole, I quote from a letter recently received from County Agent John Zahorik, Alma, Wisconsin. "Last year," he writes, "we tried some plowing under of 8-8-8 at 600 pounds per acre. The field was sown to oats this spring and seeded down. One could see the difference in the strip that had the residual carry-over. The grass seeded down, mostly clover, was way up in the bundles and when the grain was shocked, one could see the difference in the grass stand as far as the eye could see."

But again I am not making any great claims for this residual carry-over. I am thinking about maximum yields of ripe corn, and I shall stick to the 8-8-8 or similar 1-1-1 ratios for corn on high-land mineral soils and shall continue to recommend it to farmers as a substitute for manure.

The question is frequently asked by farmers, "What about plow-sole fertilizers for small grain and legume seedings?" And again I tell them that on low fertility fields and where larger than the usual 200- to 300-pound applications of fertilizer are warranted, this plow-sole method may be found advantageous. A demonstration on alfalfa previously reported by the writer in Better Crops with Plant Food was checked again in 1945 and yield data were taken on the second-year alfalfa crop. The striking differences in the yields were repeated. (See Table 1.)

A report on similar trials with plow-under fertilizer for alfalfa is reported by Dr. A. R. Midgley, Research Agronomist of the Vermont Agricultural Experiment Station. His report was summarized in the Potash News Letter of October 1945, as follows: "While two years of work on two soil types favored shallow placement of fertilizer for alfalfa (possibly due to the greater amount of rainfall in 1943 as compared to 1944) plowing under of fertilizer has given greater response during the third year with more vigorous alfalfa and promise of greater longevity. There was a marked advantage in applying fertilizer with manure rather than spreading each separately. In new seedings of alfalfa in oats, when both 400 and 800 pounds of 3-12-6 fertilizer were used, there was a marked advantage in applying fertilizer on the bottom of the furrow, and the next best result was obtained by drilling the fertilizer on top of the soil before plowing. Both methods were superior to the broadcast application after plowing."

TABLE 1.—RESULTS OF PLOW-SOLE FERTILIZER ON GRAIN AND HAY

Name and address of co-operator and soil type	Treatment and how applied	Yield of grain 1943	Yield of hay 1944	Yield of hay 1945	Value of increase grain & hay	Cost of fertiliser	Profit over cost of fertilizer
Edwin Klahn, DeForest Carrington Silt Loam	450# 0-20-0 on plow-sole	55.7 bu.	(alfalfa) 4275#	No	yield	data	for 1945
	450# 0-20-20 on plow-sole	81.8 bu.	(alfalfa) 4750#	7700#	$66.57	$11.37	$55.20
	No fertilizer	49.8 bu.	(alfalfa) 2925#	5250#			

(Hay yields for 1944 and 1945 represent two cuttings.)

Rutabagas respond amazingly to plow-sole fertilizer treatment on the Harold Wymore farm at Ashland, Wisconsin. (Superior red clay). The yield on the plot receiving 800 pounds of 8-8-8 per acre on the plow-sole plus 300 pounds of 3-12-12 (applied broadcast after plowing) was 9.62 tons per acre. The plot receiving 300 pounds of 3-12-12 only (applied broadcast after plowing) yielded 5.08 tons per acre.

The advantages of deep placement of commercial plant food have been repeated over and over again in the numerous articles that have appeared in recent years in the farm press and the advertising leaflets put out by farm implement and fertilizer manufacturers. We need not repeat them here except to point out that the banding of the fertilizer on the furrow bottom does show a distinct advantage over broadcasting and plowing under since phosphate fixation is reduced to a minimum and the availability of all plant-food nutrients is enhanced by improved moisture relationships. Dr. George D. Scarseth and his associates in Bulletin 482, "How to Fertilize Corn Effectively in Indiana," have presented convincing evidence on this point. Increases in the yield of corn due to banding on the plow-sole versus broadcast and subsequent plow-under show gains of 10 to 14 bushels in favor of plow-sole banding. Nevertheless it is true that farmers will get good results even where the fertilizer is broadcast first and then plowed under.

The large farm operator has complained that application with the attachment on the plow slows down his operations. But it is also true that it takes time to apply the fertilizer in a separate operation. We do recognize the fact that plowing is an operation that must be done during relatively short periods in the spring or fall and even then, only when the land is fit to plow.

The problem of getting this 8-8-8 fertilizer down deep in the soil and still keep it in bands to thus avoid fixation of the phosphate was tackled by a large operator in Illinois in 1945, Claude W. Thorp and his son Carl of Clinton, Illinois, who were sold on the deep-placement idea and the banding of the fertilizer. They had previously used the conventional plow-sole attachment for plows and had done a little experimenting themselves by the way of comparing broadcast before and after plowing versus the plow-sole method. In their large operations (120 tons of 8-8-8 applied in 1945) the plow-sole method as followed in 1944 was too slow. So after talking the matter over with R. H. Wileman, Agricultural Engineer at Purdue University, Carl

Thorp and his father proceeded to design a machine that would get this fertilizer down to a depth of seven or eight inches and still keep it in bands. Professor Wileman had a hand in the design of the first attachments made for plows and was already working on this new idea when the Thorps interviewed him last spring. The machine they designed is simple—a fertilizer hopper with positive feed, mounted on a field cultivator. The spring tooth shovels of the field cultivator open the furrows, and the fertilizer tubes deliver the plant food to a special heel back of these cultivator shovels at the desired depth and place it in bands 9 or 18 inches apart. This machine permits the application of fertilizer after the land has been plowed and disced. A more complete description of this improvised machine was presented in an article by E. W. Nordlinger, Crops Editor for the Food Packer magazine, in the January issue of Better Crops With Plant Food.

The small farmer, however, will continue to use the regular attachment for his plow. More and more farmers in Wisconsin are applying their fertilizer in the fall when time is not such an important element as when all the plowing and fertilizing are left until spring.

Results of Demonstrations in 1945

In 1945 a total of some 50 or 60 plow-sole fertilizer demonstrations were conducted. Many of these demonstration plots were set up directly by county agents. The results in 1945 ranged from poor to outstanding. A wider range of crops was used in our 1945 test plots than in previous years. The results on corn were much the same as reported in previous years—1942, 43, and 44. Increases in yields due to plow-sole treatment ranged from 10 to 40 bushels per acre. My observations this past year coincide with those of previous years, namely, that on fields where the fertility level is above average or high you will not see any marked response to fertilizer treatment. On those fields where the fertility level is low and where manure is not available, profitable returns can be expected.

A number of trials were carried out on potatoes, sugar beets, rutabagas, and sweet corn. The results of a selected

(*Turn to page* 39)

O. D. Brace and Son, Janesville, Wisconsin, cooperated in a plow-sole demonstration on corn in 1945. The large field selected (Miami silt loam) received a light application of manure. The response to fertilizer treatment was: No fertilizer—27.6 bu. per acre; 2-12-6 at 125 lbs. per acre in hill—35.1 bu. per acre; 2-12-6 at 125 lbs. in hill plus 825 lbs. 8-8-8 on plow-sole 55.6 bu. per acre.

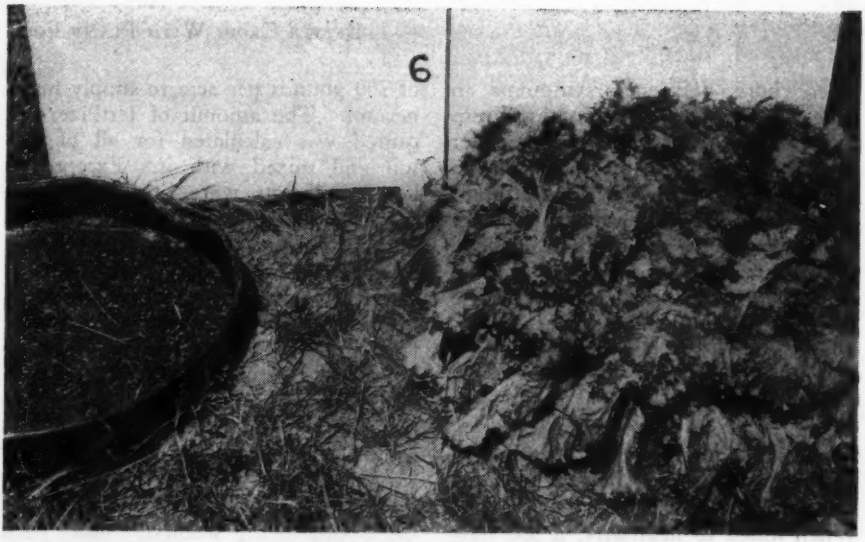


Fig. 1. Lettuce grown from seed. Without borax, left, the seedlings turned yellow and completely died when less than two inches high. With borax, right, excellent growth was obtained.

Boron Deficiency of Lettuce

By A. R. Midgley and D. E. Dunklee

Vermont Agricultural Experiment Station, Burlington, Vermont

A YELLOWING of lettuce heads has been observed in some Vermont gardens for at least five years, but it has probably occurred for a much longer period. The yellowed lettuce rotted in the center of the head and then died instead of producing a seed head in the normal way. Occasionally this trouble produced a 20 per cent loss of the crop. On one occasion, a truck gardener failed to harvest a single marketable head because of this trouble. These deficiency symptoms have appeared in both head and loose-head varieties.

The writers have suspected for a long time that the yellowing was often caused by a boron deficiency, but were unable to prove it. However, they have reported a marked growth response from use of boron on lettuce (2) and alfalfa (1).

The present experiments were conducted in the greenhouse and in the field. Pots, most of them holding a bushel or more of soil, were used. Some of the pots used were barrel-sized metal ash cans, 18 inches in diameter and 2 feet deep, with holes in the bottom for drainage. Large asphalt-painted wooden boxes were also used. Some pots were sunk in the ground, while others were not.

A soil known to have a high capacity to fix boron was purposely used in this study, because it produces

severe boron-deficiency symptoms in spite of possible contamination from containers or from impurities in water and the ordinary commercial fertilizers used. Thus, deficiency symptoms could be easily produced and studied. Sand cultures were purposely avoided because they are artificial and because it is more difficult to obtain severe boron deficiencies on sand.

The soil used was obtained from Breadloaf, Vermont, where a high boron-fixing organic soil is found near the highway in large enough quantities to be obtained by the truckload. This soil is essentially the heavily leached A horizon of a podzol soil. When limed to neutrality, it soil fixes considerable amounts of boron out of reach of crops. The organic matter in it functions somewhat like organic zeolites in absorbing cations and anions similar to certain water softeners. This soil organic matter seems to be activated into hanging onto boron and thus decreasing its availability to plants when heavily limed.

The soil in all pots was limed to approximately neutrality with ordinary ground limestone and then fertilized with an ordinary 8-16-16 commercial fertilizer at 1,000 pounds per acre. Epsom salt was added at a rate of 200 pounds per acre to supply magnesium. The amount of fertilizer required was calculated for all of the soil and mixed with it. Except for boron, all pots were limed and fertilized exactly alike.

Fig. 2. A boron-deficient lettuce plant affected with yellow heart. The leaves forming the center of the head were abnormally butter yellow in color, whereas the outer ring of leaves remained healthy and green. A normal head at this age was all green.

Borax was added to some pots at the rate of 100 pounds per acre. This rate has been found necessary for good growth on this high boron-fixing soil. Other pots were left entirely without borax. Still others received from two to eight pounds per acre to moderate the severe boron deficiencies expected.

Lettuce of Hansen variety was used in these experiments because it is known to be readily susceptible to the trouble being studied. Some pots were planted with lettuce seed. In others, transplants from two to six inches high were placed in this soil in order to cut off their supply of boron. This allowed one to study boron-deficiency symptoms at different stages of growth. Transplants were grown in the greenhouse and only healthy, normal plants were used. In all comparisons, only transplants of equal size and character were used.

Death of Seedlings. When lettuce seed was planted on this soil which received no borax, most of the seedlings were so lacking in vigor they soon died (Fig. 1). Some plants which grew about two inches high soon turned straw or bronze color and finally died. Bronzing of leaves is often a symptom of boron deficiency in lettuce, although it probably does not occur as frequently in the field as yellowing. Normal plants were produced on soil receiving borax.

A number of trials have shown that it was impossible to produce sizeable plants without boron when seeds were planted on this soil. It was necessary, therefore, to apply a small amount of boron to moderate the deficiency or to transplant seedlings from normal soil, after they reached the desired stage of growth.

Yellow Heart or Yellows. Plants grown from seed on this soil

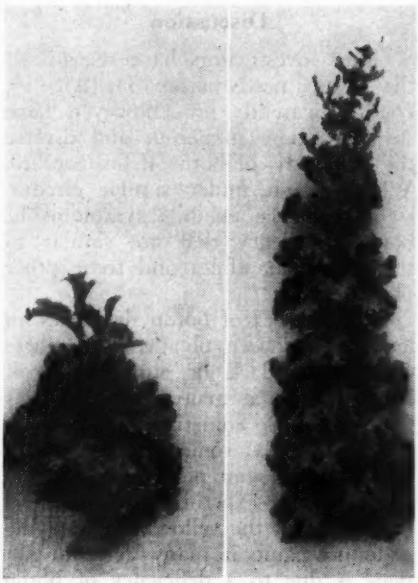


Fig. 3. Lettuce transplants of the same age. without borax, left; with borax, right. The boron-deficient plant was affected with both multiple branching and rosette due to death of the first growing point and of subsequent growing points. Lack of borax prevented further growth.

with a small but inadequate amount of boron produced small heads with leaves of butter yellow instead of the normal green color (Fig. 2). The outer leaves usually remained a healthy green, but the portion of the head affected with yellowing usually rotted later on.

Rotten Heads. As the trouble progressed, some of the boron-deficient heads became brown or black with a slimy rot. Sometimes heads were rotten in the center only, with green leaves around the periphery; at other times the whole head rotted. The slimy stage is undoubtedly due to an invasion of secondary microorganisms after the central growing portion had become weakened from lack of boron. The kind of invading organisms was not determined.

Dieback. Marked dieback was obtained when transplants were grown without borax. One or more growing tips of the plant died, the number depending on the age of the plant at the time when the deficiency stopped the growth. Dieback was sometimes obtained before the head was formed, at other times when the lettuce was six inches high, and at different stages up until the formation of seed (Fig. 3). When dieback overtook the plant in the early head stage, heart-rot resulted, but if insufficient boron was available late in life, the resulting plant looked as though its seed branches had been cut off and the wounds had become infected, as they had a slimy appearance (Fig. 4). Borax fully prevented the dieback of lettuce at whatever stage it occurred. Dieback has been found frequently in Vermont gardens, often without other symptoms of boron deficiency being present.

Rosette. Plants grown without borax occasionally formed "rosettes." In such plants there is an excessive leafy growth with shortened spaces (internodes) on the stalk between the leaves. This did not occur in plants receiving borax.

Multiple Branching or "Witches Broom." In plants without borax, a burst of growth frequently followed dieback and the lettuce took on a broom-like appearance, looking like a whisk broom standing on its handle. The excess branches grew for various lengths of time before dieback also overtook them. There was no multiple branching on plants receiving borax. This multiple branching has been recognized quite frequently in gardens and it is often associated with yellowing and yellow heart. Sufficient boron has corrected these conditions.

Lack of Seed. Viable seed was seldom produced on plants receiving no borax, but with it a good yield was obtained. This is similar to many other plants in this respect. Lack of seed production is quite characteristic of boron deficiency and is frequently seen in the field without any other sign of a need for borax being present.

Knotted Roots. Lack of boron caused the roots of boron-deficient plants to become brown, knotted, and dwarfed in varying degrees. Such roots had a brown, seared appearance as compared with roots of boron-fed plants, which were white and vigorous.

Chemical Analysis. An attempt was made to see if boron deficiency of lettuce could be diagnosed by chemical analysis of the leaves. Yellow leaves taken from boron-deficient plants in the field were compared with leaves from healthy plants on a dry weight basis. Six analyses of healthy plants and six of boron-deficient plants were made. Leaves of healthy plants contained 35 parts per million of boron. Yellow leaves from boron-deficient plants contained 14 to 28 parts per million of boron. Thus, it is quite easy to detect boron deficiency of lettuce by chemical analysis. However, there may be borderline cases in which chemical analysis would not be reliable.

Fig. 4. Lettuce grown from small transplants. No borax, left; with borax, right. Boron deficiencies here are dieback, as indicated by black, rotten tissue where the branches emerge, and multiple branching, as shown by the three branches. Compare with the single stalk on the boron-fed plant. The boron-fed plant is normal except that it was slightly wilted and dry when the picture was taken.

Discussion

Other investigators have recognized that lettuce needs boron (3), (4), (5), (6). Apparently few, however, have suspected how numerous and diverse the symptoms of boron deficiency are. When grown under similar circumstances, lettuce exhibits symptoms of boron deficiency that are similar to those seen in alfalfa and some other plants.

Many phases of boron deficiency in lettuce have been obtained. In these experiments, lack of boron overtook lettuce plants at many stages in their development. Sometimes the phases occurred singly; sometimes several occurred in the same plant.

From these experiments the authors conclude that the yellowing and dying of lettuce plants in many Vermont gardens is due to a deficiency of boron (Fig. 5). The need for borax in fertilizers used for growing lettuce in Vermont is thus indicated. How widespread the need is for using boron on lettuce grown elsewhere is not known.

Just what rate of borax should be used in fertilizers for lettuce is not well established, although present evidence indicates that, in general, lettuce will tolerate *broadcast* applications of borax up to at least 30 pounds per acre in Vermont. However, 20 pounds per acre may be nearer the correct rate on some soils. Such an amount would probably last for several years. The borax should be broadcast and then harrowed into the soil. Attempts have been made to supply borax to plants in the garden showing symptoms of boron deficiency by spraying or watering. This is helpful only if applied while plants are young because if the growing points or heads are weakened, they are more susceptible to rot organisms. Preventing boron deficiency of lettuce plants by using borax in the fertilizer seems to be much more effective than attempting to cure it after symptoms appear.

It is probable that fertilizers con-

(*Turn on page* 42)

Fig. 1. Corn on June 14, 40 days after planting. Plants in left row received 50 pounds of potash per acre at planting. Those in right row received none and are starved for potash.

Correcting Potash Deficiency in Growing Corn

(A popular version of Circular 93 of the Tennessee Agricultural Experiment Station)

By John B. Washko

Agronomy Department, University of Tennessee, Knoxville, Tennessee

THAT legumes as a group are heavy feeders on potash and that large amounts of this nutrient are removed from the soil when legumes are harvested are facts often overlooked. Under conditions where the legumes are harvested for hay and continue to be removed from the land, the potash supply in the soil is eventually depleted. Unless replenished by the use of potash salts, commercial fertilizer, or barnyard manure, potash then becomes a limiting factor in the growth of the crop to follow. This usually is corn, since it commonly follows legumes in the rotation.

If the supply of available potash in the soil becomes so low as to fail to meet the plant requirements for normal growth, the corn develops characteristic potash-deficiency symptoms. In young plants the symptoms are a stunted growth and a yellowish-green or yellow discoloration of the leaves. Frequently, the leaves are streaked with yellow or their edges and tips are dry and appear scorched or fired (Fig. 1).

The symptoms are similar in older plants, but the marginal browning of the leaves is more conspicuous. When the deficiency is pronounced, the plants are dwarfed and weak and frequently lodge (Figs. 2, 3, and 4), and are an easy prey to disease organisms. Obviously the grain production of such plants is low. If ears are produced, they may be only nubbins with grain of poor quality (Figs. 5, 6, and 7).

Fig. 2. Corn on August 11, 98 days after planting. Plants on left are suffering from lack of potash. Plants on right received 25 pounds of potash per acre on June 14, 40 days after planting.

During the course of an investigation comparing different phosphates on several soils in East Tennessee, a series of plots was placed on a soil which brought out the relationship as outlined. This field had been in Korean lespedeza for the preceding two crop years. Indications were that it had previously been "cropped hard." When it was planted to corn in 1944 severe potash-deficiency symptoms developed on this crop, as illustrated by figure 1. The only fertilization applied to the corn was 100 pounds per acre of a 20-percent superphosphate in the row at the time of planting. The soil was a Fullerton cherty silt loam and showed considerable variability within the field. Soil samples obtained in this field tested very low in potash.

When potash starvation is detected in corn, as in this instance, the application of a potash salt is recommended. Information has been lacking, however, as to the amount to use—in particular for potash-starved corn at different stages of maturity.

Since an unusual opportunity to study this problem was presented in this field, three potash-fertilization tests were put out, each on a different date. The rates of potash applied were as follows: 0, 25, 50, and 100 pounds per acre. Nitrogen in the form of ammonium

Fig. 3. Corn on August 11, 98 days after planting. Plants on left received no potash. Those on right received 50 pounds of potash per acre 40 days after planting.

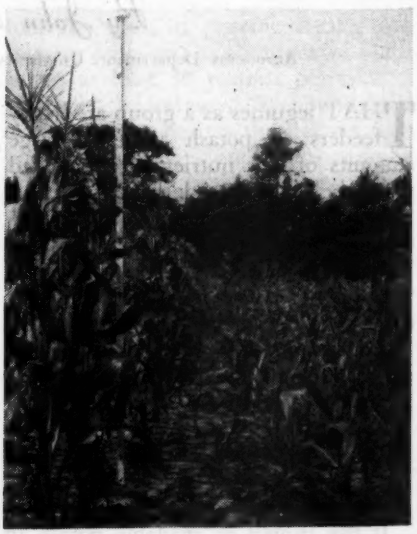


Fig. 4. Corn on August 11, 98 days after planting. Plants on left received 100 pounds of K_2O per acre 40 days after planting. Those on right received none.

Fig. 5. Plot yields of corn fertilized with potash June 14, 40 days after planting. Left to right: 0, 25, 50, and 100 pounds of potash per acre.

Fig. 6. Plot yields of corn fertilized with potash July 3, 59 days after planting. Left to right: 0, 25, 50, and 100 pounds of potash per acre.

Fig. 7. Plot yields of corn fertilized with potash July 17, 73 days after planting. Left to right: 0, 25, 50, and 100 pounds of potash per acre.

nitrate was applied to all plots at the rate of 30 pounds of nitrogen per acre, so that this element would not be a limiting factor in plant growth. The fertilizer materials were applied by hand in small furrows along the corn rows approximately 2 inches deep and 2 to 3 inches away from the plants, and then covered. The first test was put out June 14; the second, July 3; and the third, July 17—40, 59, and 73 days respectively after corn planting. These fertilizer applications were made during a period of one of the most severe drouths in Tennessee history. June had only .20 inch of rainfall and July 1.40 inches.

Despite the dry weather, the potash-starved corn responded to potash fertilization. The corn fertilized June 14, 40 days after planting, showed the greatest improvement and produced the highest yields; the second date of application, July 3, 59 days after planting, was next best; and the third date, July 17, or 73 days after planting, was poorest. This last application, while giving some correction of potash deficiency, was too late for good results.

An application of 25 pounds of potash per acre resulted in a marked improvement in the corn plants, as indicated by figure 2. When compared with the untreated plots, this rate increased yields of shelled corn 12.2 bushels, 12.7 bushels, and 3.0 bushels per acre when applied 40, 59, and 73 days respectively after corn planting, as shown by table 1. Increasing the rate of potash to 50 pounds per acre resulted in a further increase of 12 bushels per acre over the 25-pound rate only when applied 40 days after planting. At the second and third dates of application, the 50-pound rate produced approximately the

(*Turn to page* 43)

Secretary Clinton P. Anderson of the U. S. Department of Agriculture presents the deed to "Thank You Farm" to Corporal Atkins, who is wearing the Congressional Medal of Honor.

"Thank You Farm"

By T. S. Buie

Regional Conservator, Southeastern Region, Soil Conservation Service,
Spartanburg, South Carolina

IN the Caraballo Mountains of Luzon 24-year-old Corporal Thomas Eugene Atkins helped to defeat one enemy of his country. That happened last March 10 when he held an outpost foxhole against repeated, savage thrusts by the Japanese, slew 44 of them, and won the Congressional Medal of Honor.

Near his beloved Blue Ridge Mountains in northern Spartanburg County, South Carolina, Farmer Thomas Eugene Atkins has started another fight against an enemy of his country. This time, like thousands of other farmers, he is fighting soil erosion in a battle less spectacular but no less important than the one against foreign aggression.

Between March 10, when Atkins lay with a bullet-shattered hip in a foxhole, two dead buddies beside him, and fired at the enemy until he had burned out three rifles, and November 14 when he took over a 62-acre farm, there happened an event as typically American as the 24-year-old hero's courage.

To Gene Atkins it is a fairy story that came true. This slender, soft-spoken man is a sharecropper's son, and a sharecropper's life seemed in store for him when he returned from the Pacific.

But the people of Spartanburg County were grateful to Gene for what he did as a member of the famous 32nd (Red Arrow) Infantry Division. Led by the country doctor who had been family physician to the Atkinses for two decades, by a village banker, and the wide-awake publisher of the Spartanburg Herald-Journal, the friends and neighbors of the war hero bought a farm and built a Mt. Vernon style

cottage on it for Gene and his bride. It is called "Thank You Farm."

When Secretary of Agriculture Clinton P. Anderson came to Spartanburg County November 14 to present the deed to Gene, more than 1,500 persons packed the Gramling School auditorium in spite of cold, rainy weather.

It was a program that honored Gene and the other service men from the county who had helped to save the Nation from foreign foes. But it was also a program that pointed to the battle at home for the land—the battle against soil erosion and soil depletion.

John G. Landrum, the village bank president who served as chairman of the "Thank You Farm" purchasing committee, summed up the purposes of the meeting when he opened the program. He said:

"Corporal Atkins is but a symbol of all Spartanburg County boys. Many others have distinguished themselves, some even making the sacrifice of their lives. Manifestly, we cannot honor all of them this way, but our tribute today is meant for them also. . . . This is also a great day for the farmers of the County. Farm agencies representing the basic interest of the farmer have made their contribution to the improvement of agricultural methods in this region. For this work we are indebted to the Broad River Soil Conservation District and the agencies cooperating with it—the Soil Conservation Service, the Extension Service of Clemson College, the vocational teachers and their students, and the State Forestry Commission."

When Chief H. H. Bennett of the Soil Conservation Service Service spoke, he emphasized that "this is not our show." Said the Chief:

"It was Gene Atkins, who was too tough for the Japs to lick, who came home with his heart set on farming, and who decided to farm this new place of his the safe, conservation way. It is Gene Atkins, his South Carolina neighbors, and tens of thousands like them in the other 47 states who are going to safeguard our country's agricultural land from this other enemy—unnecessary soil erosion—and keep it permanently productive."

The Secretary of Agriculture told Gene and the audience: "You must continue your great soil conservation work, for according to all signs—unmistakable signs—the South is on the threshold of an industrial-agricultural revolution that may shake its economy right down to the cotton roots on Gene's farm. . . . Gene, I'm happy as a member of the President's Cabinet to hand you this deed to 'Thank You Farm.' May God bless you, Gene, as this community has blessed you."

His voice choking with emotion, the war hero replied: "I want to thank Dr. Walden and all those who made this possible. Thanks for making my dreams come true. Many others have fought and bled and suffered for the same things I did. I don't feel worthy, but with God's help I'm going to do the best I can to make this land better."

Dr. A. R. Walden, to whom Gene referred, is the country doctor who wrote to Publisher William A. Townes of the Spartanburg Herald-Journal:

Dr. H. H. Bennett pauses after a study of the conservation program being established on "Thank You Farm" to read the cornerstone dedication at the residence.

"Editorials and medals are fine, but they will not help him greatly in earning a living after the heat of war is over. My proposal is for a number of us to show our appreciation by buying him (Corporal Atkins) a home."

Dr. Walden enclosed with his letter his check for $100. Townes liked the idea, added $100 of his own money and $100 for the newspapers to help buy a "Thank You Farm." The same day Ben Gramling, merchant and farmer who knew Gene as a boy, pledged $100. Radio Stations WSPA and WORD of Spartanburg joined the campaign.

Supervisor E. C. McArthur of the Broad River Soil Conservation District read the story about "Thank You Farm" and offered all the services of the district in helping to select and plan the farm for soil and water conservation. Chairman Landrum accepted McArthur's offer because, as the Landrum bank president expressed it, "We want Gene to have a good farm, and then to give him all the help possible in keeping the land and making it better."

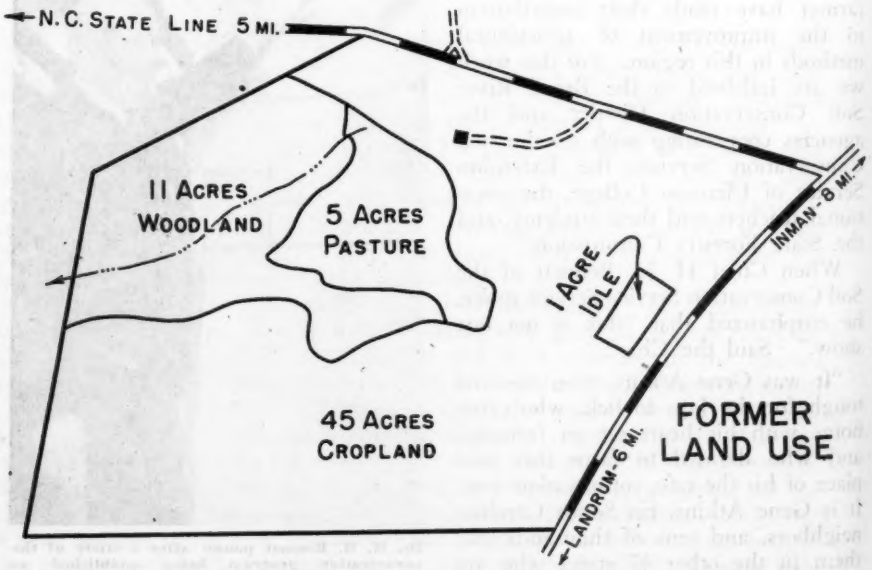
As the "Thank You Farm" campaign started, Gene was married to Vivian Rollins, the farm girl with whom he used to pick cotton and who had accepted the proposal he had written from the Pacific.

Then Gene, his bride, and his parents, Mr. and Mrs. Cleve Atkins, went to Washington. There, Gene received the Congressional Medal of Honor from President Harry S. Truman. The president told the sharecropper's son, "I'm glad you are a farmer and will have a farm of your own. I was a farmer myself."

By the time Atkins returned from Washington and had received an honorable discharge from the Army, $7,500 was in the bank for "Thank You Farm." Most of the money came in quarters, half-dollars, and dollars from people who wanted to share in the tribute to the war hero.

In the meantime, Soil Conservation Service technicians at the request of District Supervisor McArthur had made soil conservation surveys and land capability maps on all the farms offered for sale to Chairman Landrum and the farm buying committee: County Agent Joe Frank Jones, Publisher Townes,

(*Turn to page* 44)



Map 1. "Thank You Farm" was being used this way when it was purchased.

Above: First step in planning the farm for soil conservation was a soil survey made by Jackson Bennett, assigned by the Soil Conservation Service.

Below: District Conservationist J. H. Talbert (right) goes to the farm with Corporal and Mrs. Atkins to help work out the complete farm conservation plan.

Above: This natural draw, Talbert points out, will make a good site for a sericea meadow into which terraces may be emptied.

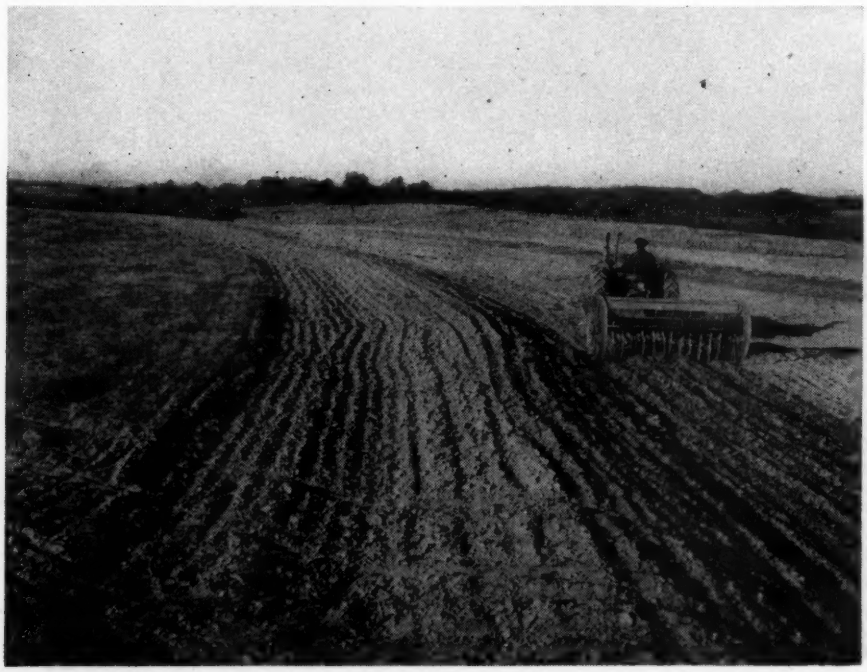
Below: The eroded pasture land, little more than idle land now, can be turned into profitable use with kudzu. (See next picture.)

Above: The land is being prepared on the contour for the planting of kudzu crowns. (Compare with picture, bottom last page.)

Below: A wildlife border between the steep land in woods and the cultivated field is being prepared for planting to sericea and bicolor lespedeza.

Above: This field is being prepared for the seeding of small grain in alternate terrace intervals. The small grain will be overseeded with lespedeza.

Below: Small grain is being drilled on the contour in the terraces of this field which will be kept in cultivation.



The Editors Talk

Agricultural Science

The march of progress in the science of agriculture is steady but so relatively slow as compared to other industries that its tremendous importance and effects are often lost to public consciousness. The very nature of the long experimentation necessary in plant and animal breeding, soil and fertilizer problems, and the myriad other phases of science involved in an improved agriculture does not produce "atomic" explosions to startle and awake the public to the alertness of our agricultural research workers and the value of their work.

It is gratifying, therefore, to have the annual reports from officials working in these fields. Such a report is one from Dr. Robert Salter, Chief of the Bureau of Plant Industry, Soils, and Agricultural Engineering, which has been summarized in a recent publicity release by the Agricultural Research Administration of the U. S. Department of Agriculture.

Dr. Salter covers in his report, the release says, a wide variety of results of research work, including new compounds for weed control and for various unusual purposes, soil and fertilizer problems, and new machines for production and processing, as well as the development of new varieties that make it possible for farmers to produce higher-yielding crops which overcome such hazards as diseases and cold.

As a part of the year's research, much of which was in cooperation with State Experiment Stations, results of more than 24 new varieties of crop plants were announced and described. The report gives more importance, however, to the demonstrated value of the new varieties brought out within recent years (those that have now become well established on farms where they have been found superior to those formerly in use). Not only did new varieties prove of great value in the country's critical period, but as their use spreads and as still better varieties come out, production continues to increase.

"This year," says Dr. Salter, "it has been estimated, for example, that new varieties of wheat distributed to farmers since World War I added 100 million bushels to the 1944 crop of hard red spring wheat. In a similar recent appraisal it was estimated that five improved varieties of rice grown on 48 per cent of the southern rice acreage in 1944 gave yields 13 per cent higher than the standard old varieties and added nearly $10,500,000 to the growers' income."

More hybrid corn varieties have been developed for certain areas, especially the South. Hybrid corn last year represented 64 per cent of the total planting and is estimated to account for two-thirds to three-fourths of a billion bushels a year. New, better adapted varieties that are reported from time to time increase the hybrid acreage and tend to raise these figures.

Another field in which Dr. Salter's report indicates increasing efficiency in crop production is cotton growing in one-variety communities, a method put in effect over a 20-year period to provide better and more uniform fiber. By 1944 the number of these communities in the cotton belt had increased to 2,194 in 581 of the South's 775 cotton counties. The 300,000 growers who participate in the one-variety program have been making an extra cash return of $8 an acre a year on their more than 7,000,000 acres of cotton, a total annual gain of $56,000,000.

Other gains resulting from this bureau's recent research include: Better understanding of the use of crop residues in dry farming; new methods of handling grain and other farm products in storage; progress in mow-curing of hay and peanuts; various new designs of machines for field work and preliminary processing of farm crops; progress with alfalfa, grass, and other forage crops; new knowledge of tree diseases, new sprays to prevent pre-harvest drop of apples and pears; improvements in nut growing; new ways with vegetables; a widely-adapted hybrid green onion; hybrid tomatoes; more potato varieties; new ways of propagation from cuttings and seed; and improvements in shipping tomatoes under refrigeration.

Calling attention to a wide variety of research on problems of soils and fertilizers, Dr. Salter's report gives emphasis to the economic importance of results of fertilizer experiments in North Carolina that have shown the possibility of doubling the corn yield there within 10 years, a "new finding in a familiar field." This result leads him to comment that "until principles of science are applied on the farm, their value to agriculture is unrealized." He then relates that in this corn example there was an instance in which on one farm 120 pounds of nitrogen to the acre, combined with hybrid seed and closer spacing in planting, brought the yield from 19 bushels up to 107 bushels. "The cost of the corn increase," he says modestly, "farmers can well afford to pay."

"Rest Cures" Worn Out

J. C. Hackleman, Professor of Crops Extension at the University of Illinois College of Agriculture, is credited with the statement that "the notion of giving worn-out farm land a 'rest cure' has fortunately just about passed." At one time, he says, farmers thought that if they put "tired acres" into pasture, the land could be rested two or three years and would come back, like a man following a good vacation, as fresh and vigorous as ever.

Calcium leaches out of the soil, and every ton of beef, pork, mutton, or milk produced on these pastures removes nitrogen, phosphorus, potassium, and calcium or lime just as surely as does a crop of corn, oats, wheat, or hay, he explains. In addition, as these permanent pastures become less productive they provide less cover, and the result is more loss through erosion, until on rolling pastures the present crop is largely weeds or unpalatable weed grasses. At least half of the two million Illinois acres devoted to permanent pasture is just barely producing enough to pay the taxes.

But Professor Hackleman sees hope for these worn pastures and has five simple steps which will transform them into productive acreage in one or, at most, two years. The steps are to test the soil, treat it with needed minerals, disc these minerals thoroughly while preparing a reasonably good seedbed, reseed with a mixture of legumes and grasses, and control grazing for at least a year, giving the legumes and grasses a chance.

That the situation is not peculiar to Illinois is seen in a recently published estimate by officials in North Carolina that about 90 to 95% of the 1,450,000 acres in permanent pastures in that State need renovation with lime, fertilizer, and seed. Without doubt, pasture improvement programs will receive due emphasis this year.

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
	Aug.-July	.....	July-June	July-June	Oct.-Sept.	July-June	July-June	July-June	....
Av. Aug. 1909–July 1914....	12.4	10.0	69.7	87.8	64.2	88.4	11.87	22.55	....
1920.....	15.9	17.3	125.3	141.7	61.8	182.6	16.46	25.65	....
1921.....	17.0	19.5	113.3	113.1	52.3	103.0	11.63	29.14	....
1922.....	22.9	22.8	65.9	100.4	74.5	96.6	11.64	30.42	....
1923.....	28.7	19.0	92.5	120.6	82.5	92.6	13.08	41.23	....
1924.....	22.9	19.0	68.6	149.6	106.3	124.7	12.66	33.25	....
1925.....	19.6	16.8	170.5	165.1	69.9	143.7	12.77	31.59	....
1926.....	12.5	17.9	131.4	117.4	74.5	121.7	13.24	22.04	....
1927.....	20.2	20.7	101.9	109.0	85.0	119.0	10.29	34.83	....
1928.....	18.0	20.0	53.2	118.0	84.0	99.8	11.22	34.17	....
1929.....	16.8	18.3	131.6	117.1	79.9	103.6	10.90	30.92	....
1930.....	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931.....	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932.....	6.5	10.5	38.0	54.2	31.9	38.2	6.20	10.33	....
1933.....	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934.....	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935.....	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936.....	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937.....	8.4	20.4	52.9	82.0	51.8	96.2	8.74	19.51	....
1938.....	8.6	19.6	55.7	73.0	48.6	56.2	6.78	21.79	....
1939.....	9.1	15.4	69.7	74.9	56.8	69.1	7.94	21.17	....
1940.....	9.9	16.0	54.1	85.5	61.8	68.2	7.58	21.73	....
1941.....	17.0	26.4	80.7	94.0	75.1	94.5	9.67	47.65	....
1942.....	19.0	36.9	117.0	119.0	91.7	109.8	10.80	45.61	....
1943.....	19.9	40.5	131.0	204.0	112.0	136.0	14.80	52.10	....
1944.....	20.7	40.8	149.0	192.0	109.0	141.0	16.40	52.70	....
1945									
January.....	20.20	41.9	158.0	190.0	107.0	146.0	17.10	52.80	....
February....	19.99	31.8	165.0	201.0	106.0	147.0	17.70	52.70	....
March.....	20.24	21.4	171.0	207.0	107.0	148.0	18.10	52.00	....
April.....	20.20	21.4	174.0	211.0	107.0	149.0	16.90	51.90	....
May.....	20.51	42.2	177.0	214.0	108.0	149.0	16.50	52.10	....
June.....	20.90	51.2	180.0	220.0	111.0	150.0	15.90	52.50	....
July.....	21.25	56.3	183.0	230.0	112.0	146.0	15.40	55.00	....
August.....	21.33	44.9	167.0	256.0	113.0	145.0	14.60	52.50	....
September...	21.72	43.2	138.0	207.0	112.0	145.0	14.30	51.40	....
October.....	22.30	45.9	126.0	180.0	113.0	151.0	14.30	51.00	....
November...	22.52	46.7	131.0	186.0	111.0	153.0	14.90	51.30	....
December....	22.84	43.8	137.0	194.0	109.0	154.0	15.40	51.40	....
1946									
January.....	22.36	36.3	145.0	208.0	110.0	154.0	15.70	50.90	....
Index Numbers (Aug. 1909–July 1914 = 100)									
1920.....	128	173	180	161	96	207	139	114	....
1921.....	137	195	163	129	81	117	98	129	....
1922.....	185	228	95	114	116	109	98	135	....
1923.....	231	190	133	137	129	105	110	183	....
1924.....	185	190	98	170	166	141	107	147	143
1925.....	158	168	245	188	109	163	108	140	143
1926.....	101	179	189	134	116	138	112	98	139
1927.....	163	207	146	124	132	135	87	154	127
1928.....	145	200	76	134	131	113	95	152	154
1929.....	135	183	189	133	124	117	92	137	137
1930.....	77	128	131	123	93	76	93	98	129
1931.....	46	82	66	83	50	44	73	40	115
1932.....	52	105	55	62	50	43	52	46	102
1933.....	82	130	118	79	81	84	68	57	91
1934.....	100	213	64	91	127	96	111	146	95
1935.....	90	184	85	80	102	94	63	135	119
1936.....	100	236	164	106	163	116	94	148	104
1937.....	68	204	76	93	81	109	74	87	110
1938.....	69	196	80	83	76	64	57	97	88
1939.....	73	154	100	85	88	78	67	94	91
1940.....	80	160	78	97	96	77	64	96	111
1941.....	137	264	116	107	117	107	81	211	129
1942.....	153	369	168	136	143	124	91	202	163
1943.....	160	405	188	232	174	154	125	231	245
1944.....	167	408	214	219	170	160	138	234	212
1945									
January.....	163	419	227	216	167	165	144	234	262
February....	161	318	237	229	165	166	149	234	223
March.....	163	214	245	236	167	167	152	231	203
April.....	163	214	250	240	167	169	142	230	259
May.....	165	422	254	244	168	169	139	231	193
June.....	169	512	258	251	173	170	134	233	269
July.....	171	563	263	262	174	165	130	244	244
August.....	172	449	240	292	176	164	123	233	240
September...	175	432	198	236	174	164	120	228	159
October.....	180	459	181	205	176	171	120	226	181
November....	182	467	188	212	173	173	126	227	235
December....	184	438	197	221	170	174	130	228	223
1946									
January.....	180	363	208	237	171	174	132	226	249

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Fish scrap, wet acidulated 6% ammonia, 3% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.05	$3.37	$3.52
1922	3.04	2.58	6.07	4.66	3.54	4.75	4.99
1923	3.02	2.90	6.19	4.83	4.25	4.59	5.16
1924	2.99	2.44	5.87	5.02	4.41	3.60	4.25
1925	3.11	2.47	5.41	5.34	4.70	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.15	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.35	4.32	5.70
1928	2.67	2.30	7.06	6.63	5.28	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.69	4.61	5.72
1930	2.47	1.81	4.78	4.96	4.15	3.79	4.58
1931	2.34	1.46	3.10	3.95	3.33	2.11	.46
1932	1.87	1.04	2.18	2.18	1.82	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.58	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.84	2.67	3.27
1935	1.47	1.15	4.59	3.10	2.65	3.06	3.65
1936	1.53	1.23	4.17	3.42	2.67	3.58	4.25
1937	1.63	1.32	4.91	4.66	3.65	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.17	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.12	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.35	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.27	3.76	4.43
1942	1.74	1.41	6.11	5.77	3.34	5.04	6.76
1943	1.75	1.42	6.30	5.77	3.34	4.86	6.62
1944	1.75	1.42	7.68	5.77	3.34	4.86	6.71
1945							
January	1.75	1.42	7.81	5.77	3.34	4.86	6.71
February	1.75	1.42	7.81	5.77	3.34	4.86	6.71
March	1.75	1.42	7.81	5.77	3.34	4.86	6.71
April	1.75	1.42	7.81	5.77	3.34	4.86	6.71
May	1.75	1.42	7.81	5.77	3.34	4.86	6.71
June	1.75	1.42	7.81	5.77	3.34	4.86	6.71
July	1.75	1.42	7.81	5.77	3.34	4.86	6.71
August	1.75	1.42	7.81	5.77	3.34	4.86	6.71
September	1.75	1.42	7.81	5.77	3.34	4.86	6.71
October	1.75	1.42	7.81	5.77	3.34	4.86	6.71
November	1.75	1.42	7.81	5.77	3.34	4.86	6.71
December	1.75	1.42	7.81	5.77	3.34	4.86	6.71
1946							
January	1.75	1.42	7.81	5.77	3.34	4.86	6.71
Index Numbers (1910-14 = 100)							
1922	113	90	173	132	117	140	142
1923	112	102	177	137	140	136	147
1924	111	86	168	142	145	107	121
1925	115	87	155	151	155	117	135
1926	113	84	126	140	146	129	139
1927	112	79	145	166	143	128	162
1938	100	81	202	188	173	146	170
1929	96	72	161	142	154	137	162
1930	92	64	137	141	136	12	130
1931	88	51	89	112	109	63	70
1932	71	36	62	62	60	36	39
1933	59	39	84	81	85	97	71
1934	59	42	127	89	93	79	93
1935	57	40	131	88	87	91	104
1936	59	43	119	97	89	106	131
1937	61	46	140	132	120	120	122
1938	63	48	105	106	104	93	100
1939	63	47	115	125	102	115	111
1940	63	48	133	124	110	99	96
1941	63	49	157	151	107	112	126
1942	65	49	175	163	110	150	192
1943	65	50	180	163	110	144	189
1944	65	50	219	163	110	144	191
1945							
January	65	50	223	163	110	144	191
February	65	50	223	163	110	144	191
March	65	50	223	163	110	144	191
April	65	50	223	163	110	144	191
May	65	50	223	163	110	144	191
June	65	50	223	163	110	144	191
July	65	50	223	163	110	144	191
August	65	50	223	163	110	144	191
September	65	50	223	163	110	144	191
October	65	50	223	163	110	144	191
November	65	50	223	163	110	144	191
December	65	50	223	163	110	144	191
1946							
January	65	50	223	163	110	144	191

Wholesale Prices of Phosphates and Potash **

	Superphosphate Baltimore, per unit	Florida land pebble 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Kainit, 20% bulk, per unit, c.i.f. Atlantic and Gulf ports
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657	$0.655
1922	.566	3.12	6.90	.632	.904	23.87	....	.508
1923	.550	3.08	7.50	.588	.836	23.32	....	.474
1924	.502	2.31	6.60	.582	.860	23.72	....	.472
1925	.600	2.44	6.16	.584	.860	23.72	....	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537	.524
1927	.525	3.09	5.50	.646	.924	25.55	.586	.581
1928	.580	3.12	5.50	.669	.957	26.46	.607	.602
1929	.609	3.18	5.50	.672	.962	26.59	.610	.605
1930	.542	3.18	5.50	.681	.973	26.92	.618	.612
1931	.485	3.18	5.50	.681	.973	26.92	.618	.612
1932	.458	3.18	5.50	.681	.963	26.90	.618	.591
1933	.434	3.11	5.50	.662	.864	25.10	.601	.565
1934	.487	3.14	5.67	.486	.751	22.49	.483	.471
1935	.492	3.30	5.69	.415	.684	21.44	.444	.488
1936	.476	1.85	5.50	.464	.708	22.94	.505	.560
1937	.510	1.85	5.50	.508	.757	24.70	.556	.607
1938	.492	1.85	5.50	.523	.774	15.17	.572	.623
1939	.478	1.90	5.50	.521	.751	24.52	.570	.670
1940	.516	1.90	5.50	.517	.730	24.75	.573	....
1941	.547	1.94	5.64	.522	.780	25.55	.570	....
1942	.600	2.13	6.29	.522	.810	25.74	.205	....
1943	.631	2.00	5.93	.522	.786	25.35	.195	....
1944	.645	2.10	6.10	.522	.777	25.35	.195	....
1945								
January	.650	2.20	6.10	.535	.797	26.00	.200	....
February	.650	2.20	6.13	.535	.797	26.00	.200	....
March	.650	2.20	6.20	.535	.797	26.00	.200	....
April	.650	2.20	6.20	.535	.797	26.00	.200	....
May	.650	2.20	6.20	.535	.797	26.00	.200	....
June	.650	2.20	6.20	.471	.701	22.88	.176	....
July	.650	2.20	6.20	.503	.749	24.44	.188	....
August	.650	2.20	6.20	.503	.749	24.44	.188	....
September	.650	2.20	6.20	.503	.749	24.44	.188	....
October	.650	2.20	6.28	.535	.797	26.00	.200	....
November	.650	2.20	6.40	.535	.797	26.00	.200	....
December	.650	2.20	6.40	.535	.797	26.00	.200	....
1946								
January	.650	2.20	6.40	.535	.797	26.00	.200	....
Index Numbers (1910-14 = 100)								
1922	106	87	141	89	95	99	....	78
1923	103	85	154	82	88	96	....	72
1924	94	64	135	82	90	98	....	72
1925	110	68	126	82	90	98	....	74
1926	112	88	114	83	90	98	82	80
1927	100	86	113	90	97	106	89	89
1928	108	86	113	94	100	109	92	92
1929	114	88	113	94	101	110	93	92
1930	101	88	113	95	102	111	94	93
1931	90	88	113	95	102	111	94	93
1932	85	88	113	95	101	111	94	90
1933	81	86	113	93	91	104	91	86
1934	91	87	110	68	79	93	74	72
1935	92	91	117	58	72	89	68	75
1936	89	51	113	65	74	95	77	85
1937	95	51	113	71	79	102	85	93
1938	92	51	113	73	81	104	87	95
1939	89	53	113	73	79	101	87	93
1940	96	53	113	72	77	102	87	....
1941	102	54	110	73	82	106	87	....
1942	112	59	129	73	85	106	84	....
1943	117	55	121	73	82	105	83	....
1944	120	58	125	73	82	105	83	....
1945								
January	121	61	125	75	84	108	83	....
February	121	61	126	75	84	108	83	....
March	121	61	127	75	84	108	83	....
April	121	61	127	75	84	108	83	....
May	121	61	127	75	84	108	83	....
June	121	61	127	66	74	95	80	....
July	121	61	127	70	79	101	82	....
August	121	61	127	70	79	101	82	....
September	121	61	127	70	79	101	82	....
October	121	61	129	75	84	108	83	....
November	121	61	131	75	84	108	83	....
December	121	61	131	75	84	108	83	....
1946								
January	121	61	131	75	84	108	83	....

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer materials‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash
1922.....	132	149	141	116	101	145	106	85
1923.....	143	152	147	114	107	144	103	79
1924.....	143	152	143	103	97	125	94	79
1925.....	156	156	151	112	100	131	109	80
1926.....	146	155	146	119	94	135	112	86
1927.....	142	153	139	116	89	150	100	94
1928.....	151	155	141	121	87	177	108	97
1929.....	149	154	139	114	79	146	114	97
1930.....	128	146	126	105	72	131	101	99
1931.....	90	126	107	83	62	83	90	99
1932.....	68	108	95	71	46	48	85	99
1933.....	72	108	96	70	45	71	81	95
1934.....	90	122	109	72	47	90	91	72
1935.....	109	125	117	70	45	97	92	63
1936.....	114	124	118	73	47	107	89	69
1937.....	122	131	126	81	50	129	95	75
1938.....	97	123	115	78	52	101	92	77
1939.....	95	121	112	79	51	119	89	77
1940.....	100	122	115	80	52	114	96	77
1941.....	124	131	127	86	56	130	102	77
1942.....	159	152	144	93	57	161	112	77
1943.....	192	167	150	94	57	160	117	77
1944.....	195	176	151	96	57	174	120	76
1945								
January...	201	179	153	97	57	175	121	78
February..	199	179	153	97	57	175	121	78
March.....	198	180	153	97	57	175	121	78
April.....	203	180	154	97	57	175	121	78
May.....	200	180	154	97	57	175	121	78
June.....	206	180	155	95	57	175	121	69
July.....	206	180	154	96	57	175	121	74
August....	204	180	154	96	57	175	121	74
September.	197	181	153	96	57	175	121	74
October...	199	182	154	97	57	175	121	78
November.	205	182	156	97	57	175	121	78
December.	207	183	156	97	57	175	121	78
1946								
January...	206	184	...	97	57	175	121	78

* U. S. D. A. figures. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning with June 1941, manure salts prices are F. O. B. mines, the only basis now quoted.

**** The annual average of potash prices is higher than the weighted average of prices actually paid because since 1926 better than 90% of the potash used in agriculture has been contracted for during the discount period. From 1937 on, the maximum seasonal discount has been 12%.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Fertilizer Shipments in Arkansas by Counties for the Fiscal Year Ending June 30, 1945," Dept. of Revenues, Little Rock, Ark.

"Fertilizers for 1946," Maritime Fertilizer Council, Moncton, N. B.

"Guide for the Use of Borax in Fertilizers Only," Maritime Fertilizer Council, Moncton, N. B., Sept. 1945.

"Fertilizer Grades for Connecticut—1946," Agron. Dept., Univ. of Conn., Storrs, Conn., Dec. 20, 1945.

"Fertilizer, Feed and Seed Report, January-June 1945," State Board of Agr., Dover, Del., June 1945.

"Production of Artificial Manure," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Bul. 415, Sept. 1945, F. B. Smith and G. D. Thornton.

"Fertilizers, Fertilizer Materials and Rock Phosphate Used in Illinois During 1944," Dept. of Agron., Univ. of Ill., Urbana, Ill., AGI253, April 1945, E. E. DeTurk.

"Inspection of Commercial Fertilizers," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., Cir. 305, April 1945, F. W. Quackenbush, O. W. Ford, A. S. Carter, H. L. Mitchell, C. M. Cohee, J. W. Jackman, L. C. Shenberger and H. C. Kennedy.

"Tonnage Showing the Different Grades of Fertilizer Shipped in the State of Louisiana From September 1, 1944 to August 31, 1945," Dept. of Agr. & Immigration, Baton Rouge, La.

"Report of Analysis of Commercial Fertilizers," Dept. of Agr. & Immigration, Baton Rouge, La.

"Inspection of Commercial Fertilizers and Agricultural Lime Products," Agr. Exp. Sta., Mass. State College, Amherst, Mass., Bul. 126, Sept. 1945.

"Nitrogen Fertilizers for Fruit Trees," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Bul. 489, Aug. 1945, A. E. Murneek.

"Analyses of Commercial Fertilizers, Manures, and Agricultural Lime, 1944," Agr. Exp. Sta., Rutgers Univ., New Brunswick, N. J., Insp. Series 17, Feb. 1945, C. S. Cathcart.

"Fertilizer Sales by Grades in Order of Tonnage July 1, 1944-June 30, 1945," Dept. of Agr., Raleigh, N. C.

"Inspection of Feeds and Fertilizers," Agr. Exp. Sta., R. I. State College, Kingston, R. I., Contribution 676, April 1945, J. J. Havern and C. H. Stetson, Jr.

"Results from Fertilizer and Liming Experiments in a 5-Year General Farm Rotation," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Cir. of Inf. 75, July 10, 1945, C. A. Mooers.

"Commercial Fertilizers in 1944-45," Agr. Exp. Sta., College Station, Texas, Bul. 674, Sept. 1945, G. S. Fraps and T. L. Ogier.

"The Inspection of Commercial Fertilizers and Agricultural Lime Products for 1945," Related Services Div., Univ. of Vt. & State Agr. College, Burlington, Vt., Report 1, Nov. 1945, L. S. Walker and E. F. Boyce.

Soils

"Some Major Factors in the Leaching of Calcium, Potassium, Sulphur, and Nitrogen from Sandy Soils," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Bul. 416, Sept. 1945, G. M. Volk nad C. E. Bell.

"Is the Moldboard Plow Doomed?" Dept. of Agron. Univ. of Ill., Urbana, Ill., AG1222, June 1944, R. S. Stauffer.

"Liming Soils in Minnesota," Agr. Ext. Serv., Univ. of Minn., St. Paul, Minn., E. Fold. 137, Oct. 1945, Paul M. Burson.

"Missouri Program of Land Improvement," Univ. of Mo., College of Agr., Columbia, Mo., Cir. 303, July 1945.

"Peach Orchard Soil Management," Agr. Exp. Sta., Pa. State College, State College, Pa., Bul. 476, Sept. 1945, C. O. Dunbar, R. D. Anthony and E. B. Kinter.

"Irrigated Pastures for Forage Production and Soil Conservation," U.S.D.A., Washington, D. C., F. B. 1973, Sept. 1945, J. G. Hamilton, G. F. Brown, H. E. Tower and W. Collins, Jr.

"Soil Survey—Bakersfield Area California," U.S.D.A., Washington, D. C., Ser. 1937, No. 12, Aug. 1945, R. C. Cole, R. A. Gardner, L. F. Loehler, A. C. Anderson, O. F. Bartholomew and J. L. Retzer.

"Soil Survey — Washington County, Virginia," U.S.D.A., Washington, D. C., Ser. 1937, No. 14, Sept. 1945, R. C. Jurney, S. S. Obenshain, E. Shulkcum, H. C. Porter, E. F.

Henry, J. R. Moore, R. E. O'Brien, and R. C. Jurney, Jr.

Crops

"Caley Pea Production and Uses in Alabama," Agr. Exp. Sta., Ala. Polytechnic Inst., Auburn, Ala., Mimeo. Ser. 17, May 1945, K. G. Baker.

"Lettuce Variety Trials," Agr. Exp. Sta., Univ. of Ariz., Tucson, Ariz., Mimeo Rept. 78, July 1945, A. E. Griffiths, R. C. Keswick, C. W. Van Horn and A. H. Finch.

"Excessive Field Exposure Coupled With Dryness of Lint May Be Responsible for Difficulties With 'Irrigated' Cotton," Agr. Exp. Sta., Univ. of Ariz., Tucson, Ariz., Mimeo Rept. 79, Sept. 1945, R. S. Hawkins.

"1944 Arkansas Corn Yield Tests," Agri. Exp. Sta., Univ. of Ark., Fayetteville, Ark., Rept. Ser. 1, April 1945, D. B. Shank and C. K. McClelland.

"Report of the Minister of Agriculture for the Dominion of Canada for the Year Ended March 31, 1945," Ottawa, Canada.

"Bush Fruits," Dept. of Agr., Dom. of Canada, Ottawa, Canada, Publ. 775, F. B. 131, Oct. 1945, D. S. Blair.

"Tobacco Substation at Windsor Report for 1944," Agr. Exp. Sta., New Haven, Conn., Bul. 487, July 1945, P. J. Anderson and T. R. Swanback.

"Culture, Fertilizer Requirements and Fiber Yields of Ramie in the Florida Everglades," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Bul. 412, July 1945, J. R. Neller.

"Legume Inoculation," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Bul. 417, Nov. 1945, F. B. Smith, R. E. Blaser and G. D. Thornton.

"The Kent and Zill Mangos," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Press Bul. 614, July 1945, G. D. Ruehle.

"The Home Orchard," Ga. Exp. Sta., Univ. System of Ga., Experiment, Ga., Press Bul. 542, March 1, 1945.

"Georgia Can Increase Peanut Production by Fifty Per Cent Without an Increase in Acreage," Ga. Exp. Sta., Univ. System of Ga., Experiment, Ga., Press Bul. 543, March 1, 1945.

"North Georgia Cotton Variety Tests, 1942 to 1944," Ga. Exp. Sta., Univ. System of Ga., Experiment, Ga., Press Bul. 552, Oct. 1945, W. W. Ballard.

"Idaho Amber Sorgo," Agr. Exp. Sta., Univ. of Idaho, Moscow, Idaho, Cir. 97, Nov. 1944, K. H. Klages.

"Sunflower Seed Production in Illinois," Agr. Exp. Sta., Dept. of Agron., Urbana, Ill., AG1252, April 1945, R. O. Weibel and W. L. Burlison.

"Potato Production on Northern Indiana Muck Soils," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., Bul. 505, Dec. 1945, N. K. Ellis.

"Camellias for the Yard," Agr. Exp. Sta., La. State Univ., Baton Rouge, La., Bul. 391, June 1945, W. D. Kimbrough and C. E. Smith.

"A Summary of Wartime Research," 57th A.R., Agr. Exp. Sta., Univ. of Md., College Park, Md., 1943-1944.

"Annual Report," Agr. Exp. Sta., Mass. State College, Amherst, Mass., Bul. 417, Aug. 1944, A. H. Lindsey.

"Agricultural Research in New Hampshire," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Bul. 354, Nov. 1944

"The Effect of Temperature, Soil Reaction, and Soil Nutrients on the Growth of Gerbera in the Greenhouse," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Cir. 69, Dec. 1944, Stuart Dunn and W. D. Holley.

"Fifty-Seventh Annual Report," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y.

"Onion Production on Muck Soils," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., Bul. 674, June 1945, G. J. Raleigh.

"Raspberry Growing in New York: Culture, Disease, and Insects," N. Y. State Agr. Exp. Sta., Geneva, N. Y. Cir. 153, Rev. March 1, 1945, G. L. Slate, R. F. Suit, and F. G. Mundinger.

"Cultivation of Milkweed," Agr. Exp. Sta., N. D. Agr. College, Fargo, N. D., Bul. 333 (Tech.), April 1945, O. A. Stevens.

"Composition and Vitality of Quack Grass Roots," Agr. Exp. Sta., N. D. Agr. College, Fargo, N. D., Bul. 334 (Tech.), June 1945, A. J. Pinckney.

"Oklahoma 4-H Horticulture Projects," Ext. Serv., Okla. A. & M. College, Stillwater, Okla., Cir. 316, 1945, Fred LeCrone.

"Science for the Farmer," Agr. Exp. Sta., Pa. State College, State College, Pa., Bul. 475, July 1945.

"Vegetable Variety Trials in Rhode Island 1944," Agr. Exp. Sta., R. I. State College, Kingston, R. I. M. Mimeo. Publ. 25, March 1945, E. M. Anderson and Wm. L. Marchant, Jr.

"Policy on Testing Corn Hydrids," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Cir. of Inf. 73, Feb. 1, 1945.

"Barley Following Lespedeza on Range 3 at the West Tennessee Station," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Cir. of Inf. 74, July 10, 1945, C. A. Mooers.....

"The Chemical Composition of Grasses of Northwest Texas as Related to Soils and to Requirements for Range Cattle," Agr. Exp. Sta., A. & M. College, College Station, Texas, Bul. 669, May 1945, J. F. Fudge and G. S. Fraps.

"Variety Tests of Edible Cowpeas," Agr. Exp. Sta., A. & M. College, College Station, Texas, P. R. 955, Aug. 6, 1945, Wm. H. Brittingham.

"Some Preliminary Trials With Rescue Grass," Agr. Exp. Sta., A. & M. College, College Station, Texas, Sept. 17, 1945, R. C. Potts and R. L. Hensel.

"Report of the College of Agriculture," Univ. of Vt., Burlington, Vt., A. R. 1, Oct. 1945.

"Research for Better Farming and Farm Living," U.S.D.A., Washington, D. C., Aug. 1945.

Economics

"Price Summaries for Some Truck and Fruit Crops," Agr. Econ. Project, Univ. of Hawaii, Honolulu, Cir. 184, Nov. 1945, Ralph Elliott.

"The Cost of Producing And Marketing Snap Beans," Agr. Exp. St., College of Agr., Urbana, Ill, AE2215, July 1944, R. A. Kelly

"Farmers' Cooperative Business Organizations in Louisiana," Agr. Exp. Sta., La. State Univ., Baton Rouge, La., Bul. 392, June 1945, BB. M. Gile and J. M. Baker.

"Private Forest Land Ownership and Management in the Loblolly-Shortleaf Type in Southern Arkansas, Northern Louisiana and Central Mississippi," Agr. Exp. Sta., La. State Univ., Baton Rouge, La., Bul. 393, July 1945, H. H. Chamberlin, L. A. Sample and R. W. Hayes.

"The Farm Real Estate Situation in Maryland," Agr. Exp. Sta., Univ. of Md., College Park, Md., Bul. A35, Jan. 1945, L. Bohanan, S. H. DeVault, and W. P. Walker.

"Why Farm Earnings Vary," Agr. Exp. Sta., Univ. of Minn., St. Paul, Minn., Bul. 386, June 1945, G. A. Pond.

"Milk Production," Agr. Exp. Sta., Miss. State College, State College, Miss., Bul. 401, June 1944, H. O. West.

"Land Prices," Agr. Exp. Sta., Univ. of Neb., Lincoln, Neb., Bul. 379, Sept. 1945, Frank Miller and H. C. Filley.

"Weather and Crop Yields in New York," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., AE527, July 1945, E. G. Misner.

"Social Factors of Farm Ownership in Oklahoma," Agr. Exp. Sta., A. & M. College, Stillwater, Okla., Bul. No. B-289, Nov. 1945, R. T. McMillan and O. D. Duncan.

"Social Factors Related to Farm Housing in Southern Oklahoma," Agr. Exp. Sta., Okla. A. & M. College, Stillwater, Okla., T. Bul. No. T-22, Oct. 1945, R. T. McMillan.

"Oklahoma Farm Production Prospects for 1946," Okla. A & M. College, Agr. Exp. Sta., Stillwater, Okla., Cir. M-150, Sept. 1945.

"Post-War Farm Production, Rhode Island," Agr. Exp. Sta., R. I. State College, Kingston, R. I., Mis. Publ. 23, Dec. 1944, J. L. Tennant and O. F. McGuire.

"Farm Production 1946 Rhode Island," Agr. Exp. Sta., R. I. State College, Kingston, R. I., Mis. Publ. 28, July 1945, J. L. Tennant.

"Farm Real Estate Situation in Five Areas of Tennessee, 1941-1944," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn. R. R. Ser. Mon. 185, July 30, 1945, B. H. Luebke, A. H. Chambers and Magnus B. Johnson.

"Agricultural History of Knox County, Tennessee, Part I, From the Beginning to 1860," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., R. R. Ser. Mon. 186, Aug. 15, 1945, H J. Bonser, C. C. Mantle and C. E. Allred.

"Agricultural History of Knox County, Tennessee, Part II, From 1860 to 1900," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., R. R. Ser. Mon. 187, Aug. 30, 1945, H. J. Bonser and C. C. Mantle.

"Agricultural History of Knox County, Tennessee, Part III, From 1900 to 1940," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., R.R. Ser. Mon. 188, Sept. 1, 1945, H. J. Bonser and C. C. Mantle.

"The Effect of Foreign Matter on the Grade, Staple and Price of Cotton," Agr. Exp. Sta., A. & M. College, College Station, Texas, P. R. 954, Aug. 2, 1945, Mary Anna Grimes.

"Citrus Fruits, Production, Farm Disposition, Value and Utilization of Sales," U.S.D.A., Washington, D. C., Oct. 1945.

"Farming Opportunities After the War in the North Central Region," U.S.D.A., Washington, D. C., Aug. 1, 1945.

"World Citrus Production and Trade," U. S. D. A., Washington, D. C., Sept. 1945, Chas. W. Smith and Ruth G. Tucker.

"World Food Situation in 1945-46," U. S. D.A., Washington, D. C., Oct. 1, 1945.

Plow-Sole Placed Plant Food for Better Crop Production

(*From page* 16)

number of these trial plots are shown in Table 2. (A complete report giving the results of all demonstrations conducted in 1945 will be furnished by the writer to anyone interested.)

After four years of demonstrations in Wisconsin, I am more convinced than ever that there is a place for these heavy-rate applications of fertilizer by the plow-sole or other deep-placement methods. The supply of manure on most farms is not sufficient to cover all fields planted to corn and other row crops. The 8-8-8 grade or similar 1-1-1 ratio of N-P-K is a good substitute for manure. Farmers have only recently discovered what commercial plant foods are really capable of doing where ap-

1945 Results of Plow-Sole Fertilizer Demonstrations in Wisconsin

TABLE 2

Corn yields are calculated on basis of 85% of a perfect stand (three stalks per hill) and 15% moisture basis. Sweet corn figured at $17.50 per ton (net); field corn at $1 per bushel; hybrid seed corn at $7 per bushel; silage at $6 per ton; potatoes at $1.50 per bushel, and rutabagas at $20 per ton.

Name and address of cooperator and soil type	Crop	Plot No.	Treatment and how applied	Yield per acre	Increase per acre	Value of increase	Profit over cost fertilizer
O. D. Brace Janesville Carrington Silt Loam	Field corn Checked 3½′ x 3½′	1	125# 2–12–6 in hill	35.1 bu.	7.5 bu.	$7.50	$5.89
		2	125# 2–12–6 in hill plus 825# 8–8–8 on plow-sole	55.6 bu.	28.0 bu.	28.00	9.07
		3	No fertilizer	27.6 bu.			
Potter Porter Evansville Carrington Silt Loam	Field corn Drilled 38″ spacing	1	125# 2–12–6 drilled	36.0 bu.			
		2	125# 2–12–6 drilled plus 700# 8–8–8 on plow-sole	69.7 bu.	33.7 bu.	33.70	19.00
Ed. Quinton Route 1, S. Milwaukee Miami Clay Loam	Silage corn Drilled	1	125# 2–12–6 drilled	10.18 tons			
		2	125# 2–12–6 drilled plus 700# 8–8–8 on plow-sole	17.00 tons	6.82 tons	40.92	26.22
Henry Burgess Shullsburg Tama Silt Loam	Hybrid seed corn Checked	1	125# 3–12–12 in hill	70.1 bu.			
		2	125# 3–12–12 in hill plus 700# 8–8–8 on plow-sole	82.5 bu.	12.4 bu.	86.80	71.10
Chas. Kennedy Fall River Sandy Loam	Field corn Checked 40″ x 40″	1	125# 3–12–12 in hill	61.4 bu.			
		2	125# 3–12–12 in hill plus 700# 8–8–8 on plow-sole	77.9 bu.	16.5 bu.	16.50	1.80
Alwin Williams Marshfield Spencer (Colby) Silt Loam	Silage corn Drilled	1	125# 2–12–6 drilled	5.44 tons			
		2	125# 2–12–6 drilled plus 400# 8–8–8 on plow-sole	7.78 tons	2.34 tons	14.04	6.64
		3	125# 2–12–6 drilled plus 800# 8–8–8 on plow-sole	13.44 tons	8.00 tons	48.00	31.20
Elmer Waldo Centuria (Polk County) Sandy Loam	Sweet corn Drilled	1	175# 3–12–12 drilled	5.586 tons	.686 tons	12.00	8.67
		2	175# 3–12–12 drilled plus 960# 8–8–8 on plow-sole	6.537 tons	1.637 tons	28.65	5.16
		3	175# 3–12–12 drilled plus 1200# 8–8–8 on plow-sole	6.546 tons	1.646 tons	28.80	.27
		4	No fertilizer	4.900 tons			
C. A. Friday New Richmond Fine Sandy Loam	Sweet corn Checked	1	100# 3–12–12 in hill	7532 lbs.	3922 lbs.	34.33	32.42
		2	100# 3–12–12 in hill plus 800# 8–8–8 on plow-sole	8184 lbs.	4574 lbs.	40.02	21.31
		3	800# 8–8–8 on plow-sole	6785 lbs.	3175 lbs.	27.78	10.98

Name and address of cooperator and soil type	Crop	Plot No.	Treatment and how applied	Yield per acre	Increase per acre	Value of increase	Profit over cost fertilizer
		4	No fertilizer	3610 lbs.			
A. N. Johnson River Falls Silt Loam (High fertility manured every year for past six years)	Field corn Checked	1	125# 2–12–6 in hill	66.2 bu.	3.0 bu.	$3.00	$ .60
		2	125# 2–12–6 in hill plus 800# 8–8–8 on plow-sole	71.0 bu.	7.8 bu.	7.80	−11.40
		3	800# 8–8–8 on plow-sole	64.2 bu.	1.0 bu.	1.00	−15.80
		4	No fertilizer	63.2 bu.			
Perley Haugerud Amery Fine Sandy Loam (No manure)	Hybrid seed corn Checked 40" x 40"	1	125# 3–18–9 in hill	57.8 bu.	12.7 bu.	88.90	86.22
		2	125# 3–18–9 in hill plus 1200# 8–8–8 on plow-sole	84.6 bu.	39.5 bu.	276.50	248.62
		3	No fertilizer	45.1 bu.			
Joe Innis Cedar Sandy Loam	Potatoes (Chippewas)	1	500# 3–12–12 drilled with planter	79.7 bu.			
		2	500# 3–12–12 with planter plus 700# 6–6–18 on plow-sole	147.3 bu.	67.6 bu.	101.40	85.92
Harry Barr Gurney Fine Sandy Loam	Potatoes (Triumphs)	1	500# 3–12–12 drilled with planter	245.0 bu.			
		2	500# 3–12–12 drilled with planter plus 800# 6–6–18 plow-sole	324.0 bu.	79.0 bu.	118.50	100.80
John Cudd Beldonville Silt Loam	Potatoes	1	1000# 8–8–8 on plow-sole	244.0 bu.	58.0 bu.	87.00	66.00
		2	1000# 6–6–18 on plow-sole	274.0 bu.	88.0 bu.	132.00	109.88
		3	No fertilizer	186.0 bu.			
I. A. Jorgensen Warrens Sandy Loam	Potatoes	1	800# 6–6–18 on plow-sole	300.0 bu.	45.0 bu.	67.50	49.80
		2	No fertilizer	255.0 bu.			
Clem Gleissner 6225 W. Brown Deer Road Milwaukee 9, Wisconsin Miami Silt Loam	Sugar beets	1	200# 3–12–12 drilled with seed	11.94 tons			
		2	200# 3–12–12 drilled plus 900# 6–6–18 on plow-sole	15.19 tons	3.25 tons	40.62	20.71
Joe Van Ees T. of Humbolt, Brown Co. Kewaunee Clay Loam	Sugar beets	1	130# 3–12–12 drilled with seed	12.09 tons			
		2	130# 3–12–12 drilled plus 560# 6–6–18 on plow-sole	14.112 tons	2.022 tons	25.27	12.89
Harold Wymore Route 4, Ashland Superior Red Clay	Rutabagas Drilled, Rows 2½' apart	1	300# 3–12–12 broadcast plus 800# 8–8–8 on plow-sole	9.62 tons	4.54 tons	90.80	74.00
		2	300# 3–12–12 broadcast	5.08 tons			

plied in the most effective manner and where liberal amounts of all three major elements are supplied. The demand for this 8-8-8 grade or similar grades will increase in the years to come. One Midwest manufacturer recently stated that he could have sold 30 thousand tons of 8-8-8 in 1945 had supplies of ammonium sulphate permitted.

The matter of drillability and physical condition is no longer a problem with the manufacturer. This grade can be made so that it will hold its granular form even after weeks of storage. The 8-8-8 is not a panacea for all crops or for all soils, but it does meet the requirements of corn and some other crops under many conditions in Wisconsin. The approved list of some 16 or 17 grades of mixed fertilizers offered for sale in Wisconsin gives the farmer a wide range of ratios from which to select the fertilizer best suited to crop and soil under any given set of conditions. I have previously suggested in this discussion the 6-6-18 grade for those crops with high-potash requirements. There are situations where the 10-6-4 grade may meet the requirements of both crop and soil. A farmer must fit the kind and amount of fertilizer he uses to his crop, his soil, and his pocketbook. In the past, we have been too conservative in our recommendations and farmers have been too stingy in their expenditures for fertilizers. We have talked perhaps too much about ultimate goals in our programs of soil improvement and have failed to recognize our current and immediate opportunities for larger yields. If we face the situation fairly and squarely and lay aside our prejudices, we may then see more clearly the actual opportunities for the profitable use of fertilizers on the millions of acres of farm land that now produce only half the yields they might if given adequate amounts of all the plant foods needed for maximum production. I am not talking less about the importance of a long-time, soil-building program, but I am talking more about making every acre produce as large a crop as it is inherently capable of every year.

Boron Deficiency of Lettuce

(*From page* 20)

taining from 5 to 10 pounds of borax per ton would help greatly in the prevention of boron deficiency of lettuce in Vermont gardens. The writers believe that all garden fertilizers should carry this small amount of boron because boron prevents so many garden troubles. A fertilizer containing this amount of boron can be drilled or *broadcast* on Vermont soils with no danger of toxicity from excess if less than a ton of fertilizer is used per acre. Rates of borax up to 90 pounds per acre have been *broadcast* in one Vermont garden before symptoms of toxicity became evident in lettuce.

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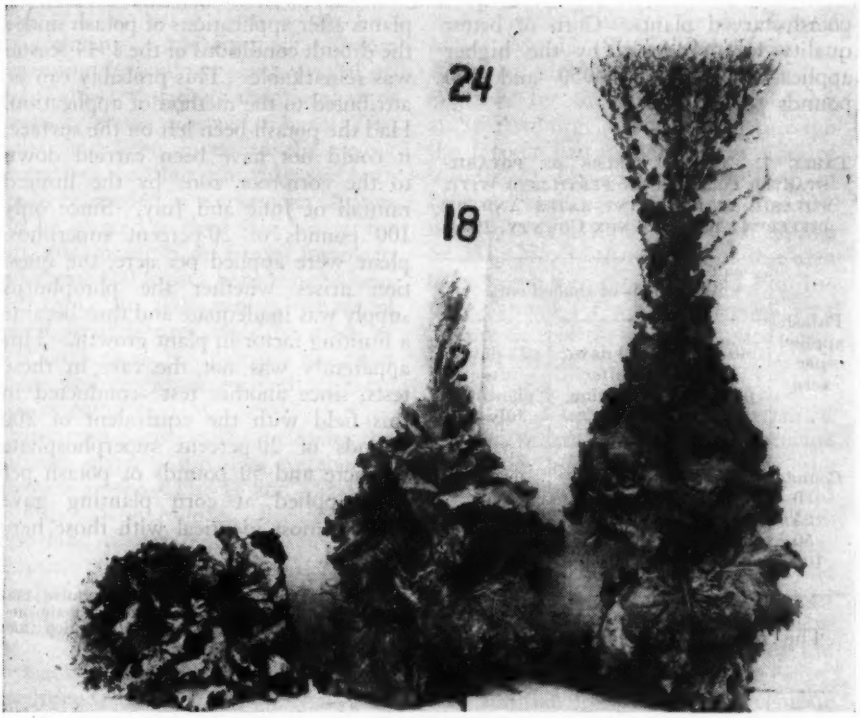


Fig. 5. Lettuce transplants from a garden. The two on the left were seriously in trouble for want of boron, contrasted with a normal plant, right, of the same age. Careful inspection of these plants revealed dieback, yellowheart, firing of the edges of the leaves, witches broom, and lack of flower buds. Rotten heart eventually would have developed in the head at the left if it had been left to grow in the garden.

Correcting Potash Deficiency in Growing Corn

(*From page* 23)

same yields as the 25-pound rate. The highest yields of corn at all application dates were obtained from the 100-pound rate. On the three respective dates of application this rate increased the yields of shelled corn by 27.1 bushels, 17.7 bushels, and 6.8 bushels per acre, as compared with the no-treatment plots.

The influence of the three rates of potash application on plant-deficiency symptoms is shown by figures 2, 3, and 4. These symptoms were largely corrected even where only 25 pounds of potash per acre were applied, as indicated when the potash was applied 40 days after planting. Potash applied 59 days after planting produced similar results. While some improvement was noted in corn fertilized with potash 73 days after planting, many of the plants and leaves were too far gone to recover.

Figures 5, 6, and 7 indicate the influence of potash on grain quality. The ears produced by potash-starved plants were largely nubbins, and the cobs were inadequately filled out. Not only did the plants receiving the potash applications yield more, but the ears produced by these plants were larger and better filled out than those of the

potash-starved plants. Corn of better quality was produced by the higher applications of potash—50 and 100 pounds per acre.

TABLE 1. GRAIN YIELDS OF POTASH-STARVED CORN WHEN FERTILIZED WITH POTASH AT DIFFERENT RATES AND ON DIFFERENT DATES, KNOX COUNTY, 1944.

Potash applied per acre	Acre yields of shelled corn		
	40 days after planting, June 14	59 days after planting, July 3	73 days after planting, July 17
Pounds	*Bushels*	*Bushels*	*Bushels*
0	3.7	8.7	8.1
25	15.9	21.4	11.1
50	27.9	21.9	10.2
100	30.8	26.4	14.9

The recovery of the potash-starved plants after applications of potash under the drouth conditions of the 1944 season was remarkable. This probably can be attributed to the method of application. Had the potash been left on the surface, it could not have been carried down to the corn-root zone by the limited rainfall of June and July. Since only 100 pounds of 20-percent superphosphate were applied per acre, the question arises whether the phosphorus supply was inadequate and thus became a limiting factor in plant growth. This apparently was not the case in these tests, since another test[1] conducted in this field with the equivalent of 200 pounds of 20-percent superphosphate per acre and 50 pounds of potash per acre applied at corn planting gave yields almost identical with those here reported.

[1] The 1944 annual report on Cooperative Fertilizer and Phosphate Comparison Experiments. Tennessee Agricultural Experiment Station and Tennessee Valley Authority.

"Thank You Farm"

(*From page* 26)

Charles O. Hearon of the *Herald-Journal* staff; Otto Marlow, a farmer, and Cliff (Farmer) Gray of Radio Station WSPA.

After studying the colored maps and hearing Gene say he wanted a cotton, corn, small grain, and livestock farm, the committee chose a 62-acre farm six miles from Landrum. It had large blocks of Class II and Class III land suitable for a row-crop, small grain, and lespedeza rotation, a small tract of Class V-A land for bottomland pasture, some Class IV land that would grow the perennials kudzu and sericea lespedeza for hay and grazing, and some Class VI land for a farm woodlot.

Typical Piedmont land, this farm needed a complete soil and water conservation program to keep it productive.

J. H. Talbert, district conservationist assigned by the Soil Conservation Service to the Broad River District, worked with Gene in making the conservation farm plan.

Three maps are presented with this article to show the steps in the conservation planning of "Thank You Farm." Land use at the time the farm was purchased is shown on Map No. 1. Land capabilities, as determined by Soil Surveyor Jackson Bennett, are shown on Map No. 2. The soil conservation farming plan as worked out by Talbert and Atkins while they went over the farm field by field may be seen on Map No. 3.

One of the factors in making a crop-

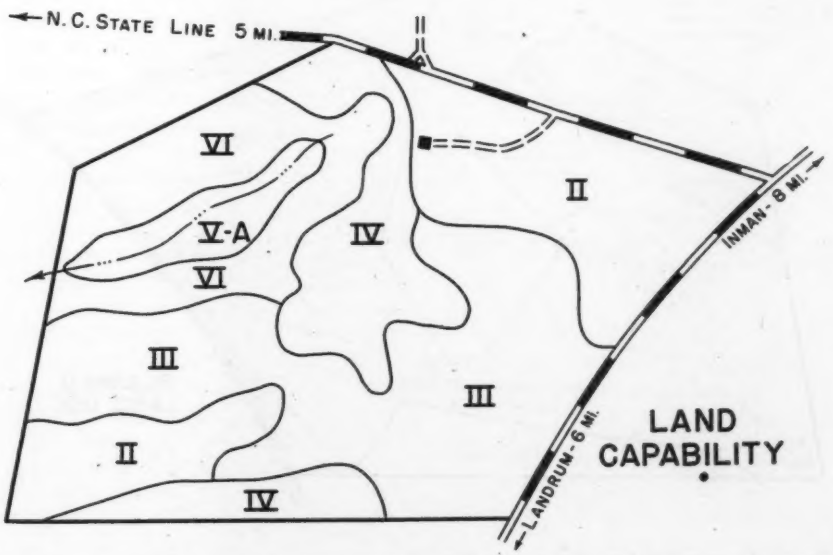
ping program on a farm is the feed requirements of the livestock. Before beginning the land use planning, Atkins and Talbert discussed the number of livestock Atkins expected to have. Two mules had been given to the young farmer by a bottling company, and both would be needed as workstock. Atkins said he wanted to keep 4 or 5 cows for milk and butter, 3 or 4 hogs for meat, and about 100 laying hens for chickens and eggs. In determining which of several possible uses could be made of each land class, the pasture, hay, and grain requirements of the livestock were kept in mind.

First consideration in developing the plan was given to the areas suitable for cultivation—the Class II and Class III land shown on Map 2. Because both these land classes require terraces and contour cultivation as conservation practices, it was necessary to locate suitable water-disposal areas into which water from the terraces could be emptied. The sites for these areas were determined by locating the natural drainageways on the farm.

One of these drainageways started near the site of the new house that was being built under the direction of Major M. H. Tardy, who was an Alabama architect before he became engineer for the Army's Camp Croft at Spartanburg, and extended through the former pasture into a low area of woods. • A two-acre meadow strip of sericea lespedeza was planned at the head of this natural "draw," as shown on Map No. 3. Another four-acre area to be planted to sericea—Field No. 1—was planned for a water-disposal area to take care of the water emptied from terraces in the remainder of the cultivated land.

Because it is a deep-rooted, perennial legume, sericea lespedeza will provide protection against erosion from the water concentrated by the terraces and emptied into the two-acre meadow strip and four-acre water-disposal area. Border strips of sericea, totaling one acre, along road banks also will be used for water disposal. Hay from these seven acres will furnish a part of the feed for farm livestock.

In addition to terracing and contour cultivation, contour strip cropping and crop rotations also are needed as conservation practices on Class II and Class



Map 2. Land-use capabilities, as determined by the soil conservation survey, are shown on this map.

III land. Once the terraces have been built, the strips can readily be established by planting alternate terrace intervals to clean-tilled crops and close-growing crops as shown on Map No. 3. Contour strip rotations can then be carried out by rotating the crops in the strips.

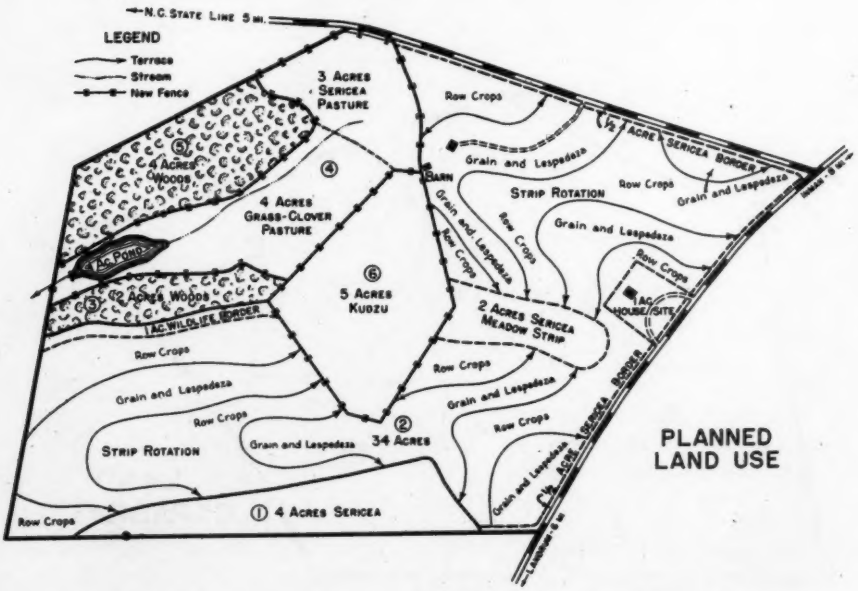
A four-year rotation of cotton, corn, small grain, and annual lespedeza was planned for 34 acres of Class II and Class III land in Field No. 2. The rotation will include 17 acres of row crops and 17 acres of small grain followed by lespedeza each year.

By producing most of his grain feed each year from fall-sown oats and barley in the small grain strips, Atkins will need only a small part of his row-crop land for corn; so only four acres were planned for this crop. Of the remaining 13 acres of row-crop land, 12 acres can be planted each year to cotton, which will be the main cash crop on the farm, and one acre to truck crops for home use. Annual lespedeza will be sown on the small grain strips in the early spring, thus giving two crops from the 17 acres in small grain-lespedeza strips each year.

The planting of one other small area will complete the treatment planned for Field No. 2. This will be a 30-foot-wide border strip for wildlife, comprising one acre between the cultivated land and the woods in Field No. 3. The border strip will include a 20-foot strip of sericea adjacent to the cultivated land and a 10-foot strip of tall-growing bicolor lespedeza next to the woods to furnish food and cover for birds and other small species of wildlife.

The area shown as woods on Map No. 1 is cut-over land. The woods consist of a scrubby growth of hardwoods and a few scattered pines. Because this is Class VI land, adapted among other possible uses to growing trees, two acres in Field No. 3 and four acres in Field No. 5 will be left as woodland and interplanted with pines to develop a fully stocked stand of desirable tree species.

A woodland management program for these six acres, including protection against damage by fire and grazing, is



Map 3. The complete farm conservation plan, as developed by Atkins and District Conservationist Talbert of the Soil Conservation Service, is shown here.

The residence built for Atkins and his bride goes up.

a part of the farm plan. By selective cutting and other good woodland management practices, the six acres left in woods will furnish a sustained yield of fuelwood, fence posts, and farm lumber to meet all the wood needs of the farm.

Between the two areas planned for woodland in Fields 3 and 5 is a low area of poorly drained land which had grown up in alders and a few poor-quality trees. This is Class V-A land, which is ideal for pasture if drained. A small stream, fed by several springs, flows through this area, making the drainage problem a simple one.

The old pasture is Class IV land. It is steep and badly eroded, and suitable only for perennial vegetation. A few small areas of adjoining Class III land will be taken in with this area and planted to kudzu. This will control the erosion and provide five acres of supplemental grazing or hay land adjoining the permanent pasture.

Thus Atkins will have 12 acres in three different kinds of pasture—grass and clover, sericea, kudzu—all in adjoining blocks. With the grain produced on his rotated cropland, this will furnish all the feed that Atkins will need for the cows, mules, hogs, and poultry he plans to keep.

Knowing the necessity of an abundant supply of plant food for perennials, Talbert recommended 100 pounds of muriate of potash per acre for both kudzu and sericea, 200 pounds of phosphate fertilizer an acre for the kudzu, and 400 pounds of phosphate fertilizer for the sericea. In improving the pasture, soil amendments recommended were 100 pounds of muriate of potash, 400 pounds of phosphate fertilizer, and one ton of lime an acre to speed the growth of white clover, Dallas grass, Bermuda grass, and annual lespedeza.

The barn which served the old tenant house on the farm is a large one and is in first-class condition. It is located at the edge of the proposed sericea pasture, through which access will be afforded for Atkins' livestock to all the grazing land planned for the farm.

There was one other thing that Atkins told Talbert he had his heart set on—a fish pond.

At the far end of the grass-clover pasture where the low Class V-A land narrows almost to a point between areas of steep Class VI land on each side, they found an ideal site for the dam.

A one-acre pond was planned. When properly stocked and fertilized, a pond that size should furnish 200 to 250 pounds of fish a year—as well as a lot of fun.

Before the plan was made, there were 45 acres of cropland, principally cotton and corn, with a small acreage of annual hay; five acres of eroded pasture overgrown with brush and weeds; and 11 acres of poorly stocked, cut-over woodland, three acres of which were low, wet land covered with alders and a scattered growth of low-quality trees. One acre, where the new house is being completed, was idle.

With a definite plan for putting every acre to its best use and treating all the land according to its needs, Atkins will have approximately the same acreage of cropland as before—46 acres—but with only 34 acres in cultivated crops, and 12 acres in perennials, including seven acres of sericea in Field No. 1 and five acres of kudzu in Field No. 6.

Instead of the five acres of unimproved pasture on steep, eroded land, he will have four acres of improved grass and clover pasture on fertile bottomland, three acres of sericea pasture, and five acres in kudzu that can be harvested for hay as cropland or used for grazing when needed.

As a part of the land use changes, the 11 acres classed as woodland will be reduced to six. But instead of a poorly stocked stand of low-quality trees, Atkins will have a thrifty stand of desirable tree species that will furnish all the wood products required on the farm.

And down at the far end of the pasture, where will be built the fish pond Gene has set his heart on, it won't be any trick at all of a summer's afternoon for him to throw in a line and catch a mess of fish for Vivian to cook for supper.

By the time Secretary of Agriculture Anderson gave the deed to Gene, most of the practices that could be placed on the land during the fall of the year had been established. Farm equipment dealers and agricultural agencies cooperating with the Broad River Soil Conservation District built the terraces, sowed small grain in alternate contour strips, shaped and seeded the meadow drainageway, set pine seedlings in the cut-over woodland, planted kudzu, prepared the wildlife border, and sloped

Atkins, after completing the conservation plan with Talbert's assistance, signs the cooperative agreement with the supervisors of the Broad River Soil Conservation District while District Supervisor E. C. McArthur looks on.

the road bank for the 15-foot border strip to be planted to sericea lespedeza.

As Bank President Landrum explained, "We have given Gene Atkins a farm and we have helped him to get started on a soil conservation program that will keep the land productive from here on out. Because every one will watch the way he farms his land, we believe that his soil conservation farming will be an inspiration and a demonstration for all the other farmers of our section."

We believe that Gene Atkins' soil conservation farming will be as much an inspiration for veterans who return to the land as his military deeds are for those who follow him in the uniform of his country.

Profit on Mississippi Soils From One Ton of Potash Under Cotton

(*From page* 9)

No fertilizer analysis tests with cotton have been conducted in the Gulf Coastal area.

The response to potash in the Sand-Clay Hills area as shown by the six tests which have been conducted has been quite variable. The average profit from one ton of potash under cotton calculated in the same manner as that for the other soils areas is $362.

Only two tests have been conducted in the Flatwoods and Pontotoc Ridge soil areas, respectively. These limited data show profits of $257 and $412 from the use of one ton of potash under cotton in the Flatwoods and Pontotoc Ridge areas, respectively.

Eleven tests have been conducted in the Northeast Prairie soil area. With two exceptions, all of these tests have been located on upland soils of heavy texture where potash is not ordinarily deficient for cotton production. A response to potash was obtained in 3 out of the 11 tests, but in 2 of these 3 only small increases in yield were due to potash. The only test which was located on bottomland soil was the test on the Central Station farm in which the profit was $706. Since only one bottomland soil was tested in this soil area, an average of the 11 tests is not indicative of the response of all soils of this area to potash under cotton. The average of 10 tests, excluding the test mentioned above, shows a profit of $26 from the use of one ton of potash under cotton.

As shown on the map, four tests have been conducted in the Northeast Highland area, two of which have been on terrace soils and two on upland soils. The response to potash in all four cases has been rather great, ranging from a profit of $440 to $659 per ton of potash used. From these four tests the average profit per ton of potash under cotton for this area is $542.

Summary

The data presented show that the greatest profit for any soil area of the State from one ton of potash under cotton is obtained on the terrace and bottom soils of the Brown Loam area, the average profit for this area being $682.

The other soil areas in descending order of profit from one ton of potash under cotton are: Northeast Highland $542, Longleaf Pine $488, Pontotoc Ridge $412, Sand-Clay Hills $362, Flatwoods $257, Yazoo-Mississippi Delta $269 (tests at Stoneville and Heathman omitted from average), and Northeast Prairie $26 (test on Central Station farm omitted from average).

While it is apparent from the data presented on the accompanying map that the estimate of the profit from one ton of potash under cotton for the

various soil areas of Mississippi is based upon insufficient data to be the most reliable, it is considered to be the best estimate available until such time as it may be possible to conduct additional fertilizer analysis tests.

It is, therefore, concluded from the data presented that : (1) potash should be used under cotton in some sections of the State in rather large amounts, (2) in some sections of the State the use of only small amounts of potash under cotton will prove profitable, (3) in certain areas which represent only a relatively small part of the State, potash is not profitable under cotton, and (4) more fertilizer analysis tests are needed to determine the potash needs for parts of soil areas which as yet have not been tested.

Tenderfoot Trail

(*From page* 5)

A few accommodation cars were waiting on the new track which connected this eastern end of the line to the terminus at Rapid City—unaware of its destiny as the summer camp of Calvin Coolidge some years later. These rattling cars took us in halting fashion across the brown prairies to Owanka—said to mean "a place to camp" in the Sioux vocabulary. Here was the post-office we would call our own and the freight address to which various boxes of Chicago mail order merchandise would all arrive in due season.

Owanka was just a place to camp, all right. Located on a broad area along the cottonwood bottoms fringing a winding creek, there were four stores and a blacksmith shop, a small beanery, and a red depot with the home of the section boss adjacent thereto. A grubby, rough, and winding trail crossed the tracks north of the mart and leaped up a sheer declivity in alarming curves without barriers, to reach the tableland where presumptuous Iowa and Nebraska farmers had staked their claims. How the boys ever managed to drive their teams with wagons laden with lumber up that gumbo cliff from town still remains a mystery.

Anyhow, the Old Soldier was waiting there when we stiffly climbed down, and he as double-delighted with our coming, giving special welcome to Major, the unexpected member. He told us on the load going home that he had lived on beans so long that it reminded him of the siege of Vicksburg, and he was mouth-watering for some of Ma's best recipes. I gave little heed to the route we took, and Ma gave less because she was tuckered out completely. That straight road of three miles to our noble claim site was afterwards to be kissed by my aching feet for trips unnumbered, as there was no rural delivery yet and you earned every letter and circular they gave you.

The Old Soldier's pride in the shed-roof shanty on the prairie, with a good south view of the distant Bad Lands, was not at once shared by Ma. She was used to trees and bushes and weedy fence rows and corn fields and neighbors. Here in our new home there were no trees for miles, the bushes were absent too, and the fences caught and held rows of tumbleweed thistles which looked like sheep on a riotous windy day when they started to travel again.

For neighbors we had, of course, the piping meadow larks by day and the devilish cries of the coyotes by evening; and an occasional visit by some curious distant squatter who wanted to pause and see how that old veteran and his folks were standing the winter. Besides the normal chores of cooking over a small cast-iron stove heated with mill slabs and lignite coal, she could pass away the time resuming where she left off in rug hooking or quilt patchwork—but even this sort of gets monotonous betimes when the sun sinks low and the chance for a bit of company is slim.

On top of this, when your well is an

open one of dubious value and small rodents fall into it, and the mice come right in and take pot-luck with you, and the raw lumber is suspected of harboring quantities of bed-bugs, and the cellar storage is a dirt cave in the gumbo-like clay outside, and you settle in such a spot before the days of radio and you can only play dominoes to while away the Dakota darkness—well, something could be said, if not done, about it. One item of cheerful consolation there was, to be sure, you didn't get mixed up with the Donner Party or suffer with the Mormons or get killed in the Civil War.

Sending orders for and receiving packages of mail-order groceries was one event that brought some solace to our squatting. Finding proper storage places for the canned milk, bacon, raisins, tea, and rice was not so easy, unless we put them under the beds. Once when the Old Soldier and Ma took a trip to Rapid City, I undertook some fancy cookery, including a projected pudding made of tapioca. I made far too much of it by mistake and was still lunching on it when they returned. I figured that tapioca was what they had that time when they fed the Five Thousand. A little went a long ways.

WHILE waiting for the Great Day of Commuting to come, a brother of mine who served as clerk to the Agent on the Pine Ridge Agency got me a "position" in the general store run by a halfbreed trader of acumen and skill. Here it was my duty to sell groceries instead of buy them. Here I was obliged to sweep out mornings and devote the rest of my long day to a slow acquiring of the Sioux tongue, at least enough of the guttural expressions to satisfy the demands of the ordinary routine of barter.

I was proud just to be able to put my hand upward, palm outward, and to sing out in breezy style the usual slogan of the trader to his victim: "How, Kola, Tak-u-wa-chin." In Yankee language it meant "How-de-do, my friend, what can I do for you—or what do you desire?"

I waited on celebrities of the day on the Sioux reservation, including Standing Soldier, chief of police, Mrs. Plenty Horses, a shrewd squaw of property, and once at least no less a personage than Red Cloud himself, noted tribal chieftain who was engaged in combat with our cavalry in the days when Rain-in-the-Face made bad weather for Uncle Sam.

AFTER an interval of many long years away from the Ogalalla influence and memory fading for detail, the phrases I used to gibber easily to tribesmen in quest of everything from canned tomatoes to shoes and sugar have largely left me. The ones I do recall cannot be put down here without a challenge or a prosecution from the Commissioner of Indian Affairs. The letters of my alphabet fail me in trying to "letter and syllable it for you." But I count those hours well spent both on the reservation (where my complexion and facial topography made me akin to the brethren) and likewise on the lonesome claim amid the buffalo wallows.

It was the largest Indian reservation in the North. From it came many of the painted make-believe savages who toured the effete East to frighten the wits out of wild west show patrons in stagecoach holdups and the burning of cabins. Within easy reach of it was the shameful scene of the Wounded Kness butchery, following in the wake of the native religious Messiah affair. Shoshones often dropped in to chat with the remnants of the Sioux braves, and I watched their mystic and dignified sign-language with awe and appreciation. To a shallow-pated kid from a Midwest high school, this raw education on the edge of civilization was a tonic and a boost. If I had it to live over no doubt my time would be better spent in "research" and questioning, and I might even take on the reser-

vation farm boss too, who was a sort of county agent to the red brethren before the pale faces ever thought of schooling and advising the farmer.

Some of the Sioux braves were sympathetic with the ranchers in opposition to the wave of agricultural settlement. They alike thought that the land was best for grazing and meat raising, and they said the plowed furrows were "wrong side up."

For the benefits derived from life on the claim there can be no financial balance cast. The Old Soldier never got any large accumulation of wealth out of his final sale of the land to a neighbor adjoining us. But he had had his fling and realized his ambition to take up some "Government land" offered as largesse to the war-weary veterans. He was then content to resume his reflective pipe on winter evenings in the Midlands and had one more stirring story to enliven his collection of well-embellished personal narratives. This experience was all he needed to round out a well-spent but humble and obscure life as an American—as he could testify to having been through two pioneer periods and a sizable war to boot. He had never been the consort of kings or the pet of politicians, and he never lapped it up at the trough of privilege. But he followed the path of his fathers and rests in the shade of their trees.

AND as for me, who shared that last big adventure which led to no glory or wealth, I guess my lesson lies in patience and confidence. Both patience and confidence came from the living out of the last epoch of westward migration, so as to feel kinship with the men who made history but seldom appear in it as heroes.

Perhaps, who knows, the time will come when folks will more fully sense the dignity and decency of those days of our nativity, even after we skim off the dross; and we shall begin to question whether some of the more recent public behavior is in tune with the legacy they left us.

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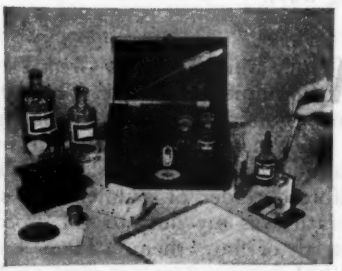

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Of Course I'm Interested (Pastures, Canada)
Meet the Family (Canada)

Reprints

T-8 A Balanced Fertilizer for Bright Tobacco
N-9 Problems of Feeding Cigarleaf Tobacco
F-3-40 When Fertilizing, Consider Plant-food Content of Crops
S-5-40 What Is the Matter with Your Soil?
K-4-41 The Nutrition of Muck Crops
E-2-42 Fertilizing for More and Better Vegetables
S-6-42 A Comparison of Boron Deficiency Symptoms and Potato Leafhopper Injury on Alfalfa
H-12-42 Wartime Contribution of the American Potash Industry
A-1-43 The Salt That Nearly Lost a War
H-2-43 Plant Food for Peach Profits
J-2-43 Maintaining Fertility When Growing Peanuts
M-3-43 Lespedeza Is Not a Poor Land Crop
Y-5-43 Value & Limitations of Methods of Diagnosing Plant Nutrient Needs
FF-8-43 Potash for Citrus Crops in California
PP-12-43 Commercial Fertilizers for Livestock Farms
A-1-44 What's in That Fertilizer Bag?
H-2-44 Efficient Fertilizers for Potato Farms
I-3-44 Doubling Production by Bettering Soils
K-3-44 Soil Tests Indicate Potash Levels
T-5-44 Southern Crops Show Need of Potash
X-6-44 Soil Management for Cannery Peas
AA-8-44 Florida Knows How to Fertilize Citrus
CC-8-44 Soil Fertility's Effect on Asparagus
KK-11-44 Growing Quality in Tomatoes
MM-12-44 Blue Lupine Is a Valuable Legume
QQ-12-44 Leaf Analysis—A Guide to Better Crops
A-1-45 Fertilized Corn Plants Require Well-Ventilated Soils
C-1-45 Fertilizers for Cotton and Corn Following Lespedeza
C-2-45 Some Whys and Wherefores for Air-Conditioning Soils
J-2-45 Potash for Legume Pastures in Florida
K-2-45 Plow-Sole Fertilizing on the Average Farm
L-2-45 Fish for Health, Recreation, and Politics
P-3-45 Balanced Fertility in the Orchard
Q-3-45 Earliness Counts with Austrian Winter Peas
R-3-45 Higher Corn Yields for North Carolina
U-4-45 New Ideas in Haymaking from New York Farmers
V-4-45 Yield and Quality of Cotton Can Be Improved by Boron
W-4-45 Fertilizing Golf Greens
X-4-45 Idle Acres in the Southeast Can Be Put to Work
Y-5-45 How Long Do the Effects from Fertilizer Last?
Z-5-45 Alfalfa—the Aristocrat
BB-5-45 Applying Experimental Work to Cotton Farming
DD-5-45 A Case of Combined Potassium and Boron Deficiencies in Grapes
EE-6-45 Balanced Sods in Orchards
FF-6-45 Orcharding from the Ground Up
GG-6-45 Know Your Soil
JJ-8-45 Plow-Under Practices
KK-8-45 From Scrub Pine to Broccoli on Cape Cod
LL-8-45 Fertilizing for Better Soybeans in North Carolina
MM-8-45 Red Clover Suggests Shortage of Potash
NN-8-45 The Effect of Borax and Lime on Quality of Cauliflowers
OO-8-45 Potash Fertilizers Are Needed on Many Midwestern Farms
PP-10-45 More Vegetables for Less Money
QQ-10-45 A Little Boron Boosts Sweet Potato Yields
RR-10-45 A Potash-Nitrate Relationship in Corn As Revealed by Tissue Tests
SS-10-45 How to Start White Dutch Clover Pastures in Florida
TT-10-45 Kudzu Responds to Potash
UU-10-45 Soil Conservation—More Plant Food—Better Crops
VV-11-45 Borax on Crimson Clover in Tennessee
WW-11-45 What Is the Best Method of Applying Fertilizer
XX-11-45 Kudzu on Abandoned Land Needs Phosphate and Potash—Maybe Borax
YY-11-45 Potash—In War and Peace
ZZ-11-45 First Things First in Soil Fertility
AAA-12-45 Rapid Soil Tests Furnish One of the Implements for Increasing Crop Yields
BBB-12-45 Success with Blueberries
CCC-12-45 Poor Soils—Poor People
DDD-12-45 Efficient Crop Production Means Balancing Supply of Available Plant Nutrients
EEE-12-45 And Now the Imperative for Agriculture and Industry
FFF-12-45 Florida's Legume Pastures Depend on Seed Source

THE AMERICAN POTASH INSTITUTE

1155 16TH STREET, N. W. WASHINGTON 6, D. C.

PRECAUTION

"Your neighbors are honest, I hope?" someone asked the old Negro.

"Yassir, dey is."

"But you keep that loaded shotgun near your hen coop."

"Dat's to keep 'em honest!"

Soldier: "Dearest, I love you terribly."

Girl: "You certainly do!"

TEXAS TABLE MANNERS

A Texas father was dining with his son in a Texas hotel, and in the course of dinner the son got into an argument with a cowboy. The cowboy called the son an offensive name, a very offensive name, and the young fellow grabbed his knife in his fist and started around the table to be avenged.

"Ain't ye got no table manners?" the old man hissed.

"But, pop, ye heered what he called me, didn't ye?"

"Yes, I heered all right, but that ain't no ground for yer fergittin' yer table manners. Put down that there knife and go at him with yer fork."

"What is a conscience?"

"Conscience is the thing that hurts when everything else feels good."

Father: "Did you put your penny in the Sunday School collection, son?"

Tommy: "No, dad, I lost it."

Father: "But this is the third week you've lost it!"

Tommy: "I know, but that other kid's luck can't last forever."

"I see," remarked young Mr. Jones, "that a man who speaks six languages has just married a woman who speaks three."

"That," replied the long-wedded Mr. Brown, "seems to be about the right handicap."

We are always glad for the man who takes himself seriously, because he creates so much laughter.

"How's the public sentiment out here?" asked the politician, who was passing through a rural community.

"Still goin' strong," answered the native. "There were sixteen cars parked in my lane last night."

TAKING A CHANCE

Magistrate: "What induced you to strike your wife?"

Husband: "Well, your honor, she had her back to me, the broom was handy and the back door was open, so I thought I'd take a chance."

A young girl talking to her grandfather, asked, "Grandfather, how old does a girl have to be to get married?"

Grandfather: "She must be old enough yet young enough, big enough yet little enough, wise enough yet dumb enough, weak enough yet strong enough, to chase a man until he catches her."

A pessimist is a man who feels that all women are bad. An optimist hopes so.

Need for—

BORON IN AGRICULTURE

Authorities have recognized that the depletion of Boron in soil has been reflected in limited production and poor quality of numerous field and fruit crops.

Outstanding results have been obtained with the application of Borax in specific quantities or as part of the regular fertilizer mix, improving the quality and increasing the production of alfalfa and other legumes, table beets, sugar beets, apples, etc.

The work of the State Agricultural Stations and recommendations of the County Agents are steadily increasing the recognition of the need for Boron in agriculture. We are prepared to render every practical assistance.

Borax is economical and very little is required. It is conveniently packed in 100 lb. sacks and stocks are available for prompt delivery everywhere in the United States and Canada. Address your inquiries to the nearest office.

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How big is your farm?

SOME FARMS are smaller than a city block. Others cover most of a county. The average U. S. farm is 174 acres. But land measurements are only one factor in determining the size of a farm. A farm is as big as its power to produce.

By increasing your farm's power to produce, V-C Fertilizer makes your farm a bigger and better farm *in yields and profits.*

Another man may own two to three times as many acres as you own. But, if his acres are poorly-fertilized scrub acres and your acres are good land, well-fertilized with V-C Fertilizer, your farm is as big as his *in yields* and your farm is a bigger farm *in profits.*

His costs of production are much greater than yours, because he has to prepare, plant, cultivate and harvest much more land than you do to get the same yield. V-C Fertilizer adds extra yields of better quality crops to your farm, without the work, worry and expense of extra land.

V-C Fertilizer is your best investment. It helps each hour of your work and each acre of your land return a richer harvest. You will never know how really big your farm is *in yields and profits,* until you try using plenty of V-C Fertilizer—the leader in the field since 1895.

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Corn . . . 1½ oz. per bu. seed.	Soy beans . 2 oz. per bu. Seed.
Peas . . . 2 " " " "	Sorghum . . 1½ " " " "
Beans . . 2 " " " " (Including Limas)	Flax . . . . . 2 " " " "
	Peanuts . . . 3 " "100 lbs. seed.

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THE PLANT SPEAKS

A new four-reel series of 16 mm., sound, color films which may be booked independently or in any combination. They may be used to best advantage when shown at least one day apart and in the following sequence:

THE PLANT SPEAKS THRU DEFICIENCY SYMPTOMS pictures soil depletion, erosion, and deficiency symptoms on plants. (Running time 25 min. on 800-ft. reel.)

THE PLANT SPEAKS, SOIL TESTS TELL US WHY depicts taking soil samples on the farm and the interpretation of soil tests. (Running time 10 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU TISSUE TESTS shows the value of tissue testing and the procedure for testing plant tissues in the field. (Running time 14 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU LEAF ANALYSIS evaluates leaves in plant growth and leaf analysis in determining fertilizer needs. (Running time 18 min. on 800-ft. reel.)

We shall be pleased to loan these films to agricultural colleges, experiment stations, county agents, vocational teachers, responsible farm organizations, and members of the fertilizer trade.

OTHER 16MM. COLOR FILMS AVAILABLE FOR TERRITORIES INDICATED

Potash in Southern Agriculture (South)
In the Clover (Northeast)
Bringing Citrus Quality to Market (West)
Machine Placement of Fertilizer (West)
Ladino Clover Pastures (West)
Potash from Soil to Plant (West)
Potash Deficiency in Grapes and Prunes (West)
New Soils from Old (Midwest)
Potash Production in America (All)
Save That Soil (All)

IMPORTANT

Requests should be made *well in advance* and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible), and period of time of loan.

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